Leica M525 OH4

User manual

10 714 367 – version -

Leica

MICROSYSTEMS

Thank you for purchasing a Leica surgical microscope system.

In developing our systems, we have placed great emphasis on simple, self-explanatory operation. Nevertheless, we suggest studying this user manual in detail in order to utilize all the benefits of your new surgical microscope.

For valuable information about Leica Microsystems products and services, and the address of your nearest Leica representative, please visit our website,

www.leica-microsystems.com

Thank you for choosing our products. We hope that you will enjoy the quality and performance of your Leica Microsystems surgical microscope.

Leica Microsystems (Schweiz) AG
Surgical Microscopy Business Unit

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User manual

In addition to instructions for use, this user manual also provides important safety notes (see the chapter entitled, "Safety notes").
Read the user manual carefully and thoroughly before placing the product in operation.

Product identification

The model code and serial number of your product are provided on the nameplate found on the illumination unit. Write this data into your user manual and always refer to it when you contact us or the service workshop regarding any questions you may have.

Model: Serial No.:

Symbols in this user manual

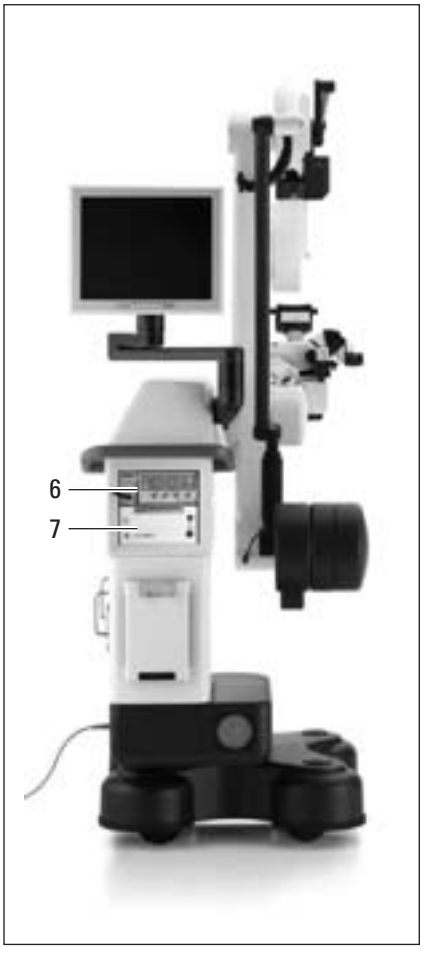
The symbols used in this user manual have the following meanings:

	Warning	Warning regarding use hazard or improper use which can cause serious personal injury or death.
	Caution	Warning regarding use hazard or improper use which can cause minor personal injury, but considerable damage to property, assets and the environment.
		Useful information that can help the user operate the product correctly and efficiently.
⇨		Call to action; here you are asked to do - something.

Design

surgical microscope Leica M525 OH4

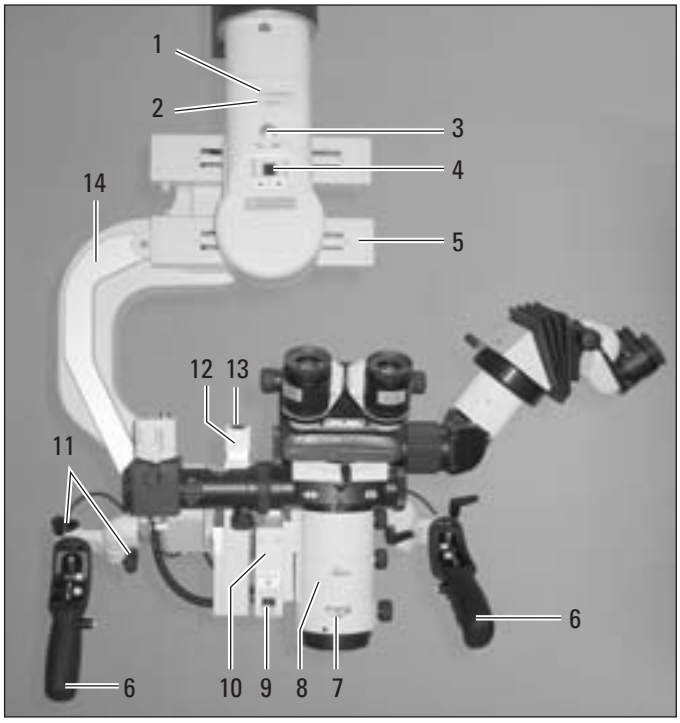
1 Swing arm
2 Tiebar
3 Video monitor (optional)
4 Control unit with touch panel
5 Suspension device for footswitch
6 Illumination unit
7 Base
8 Optical carrier Leica M525



1 Vertical arm
2 Terminals
3 Footbrake
4 Handle
5 Articulated arm for monitor
6 Camera control unit (optional)
7 System unit Leica MDRS3 (optional)

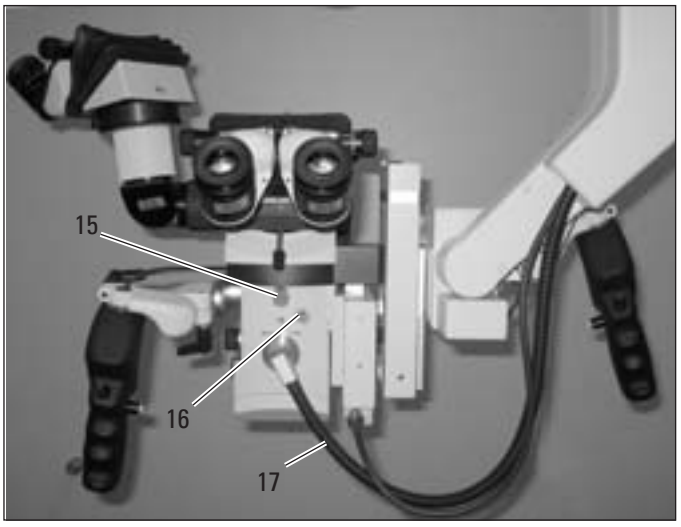
The Leica M525 with its open architecture, offers space for accommodating the video control unit and the Leica MDRS3.

Microscope Leica M525 with swing arm

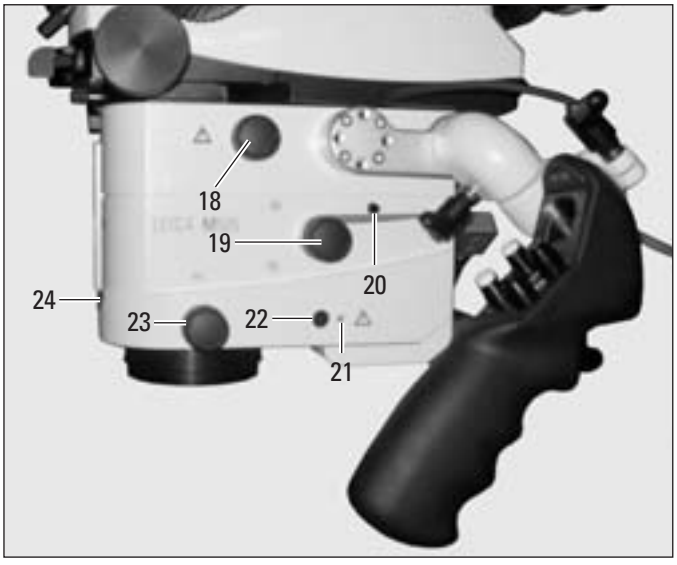


1 Status LED for fluorescence
- LED lights up white = white light mode
- LED lights up blue = blue light mode
- LED lights up yellow = NIR mode
- LED lights up green = Playback mode

2 Status LED for recording LED lights up red = recording in progress
3 Push-button for intraoperative AC/BC balancing
4 Switch for manual balancing of the C-carriage
5 C-carriage
6 CAN handle
7 Display of set working distance
8 Optical carrier M525
9 Switch for manual balancing of the A-carriage
10 A-carriage
11 CAN handle clamping lever
12 Switch for manual balancing of the B-carriage
13 B-carriage
14 Swing mount

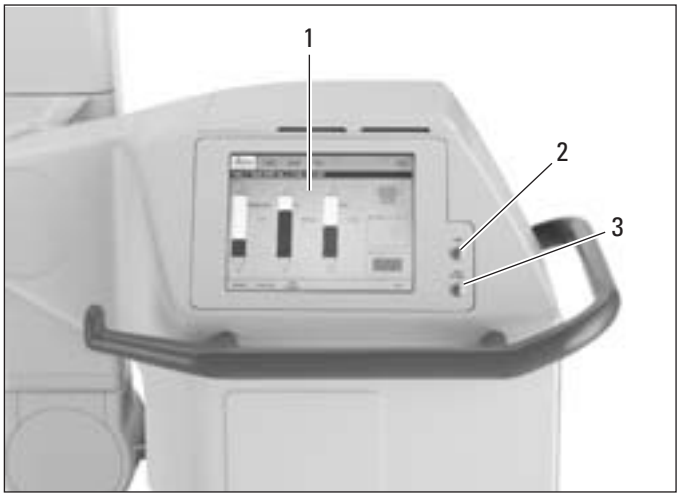


15 CAN socket for accessories (DI C500, FL400)
16 CAN socket (not used)
17 Optical fiber



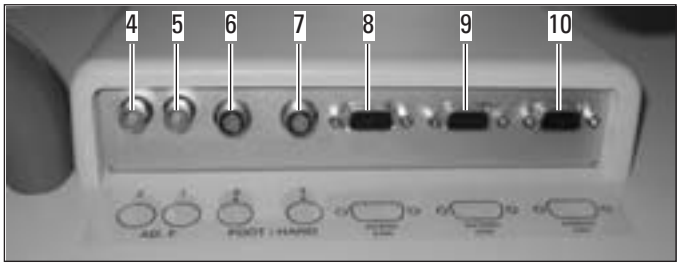
18 Rotary button for zoom adjustment
19 Rotary button for illumination field diameter adjustment
20 Reset button for zoom dependent illumination field diameter adjustment
21 Status of multifocus LED
22 Multifocus key
23 Rotary button for focus adjustment
24 Working distance display

Control unit



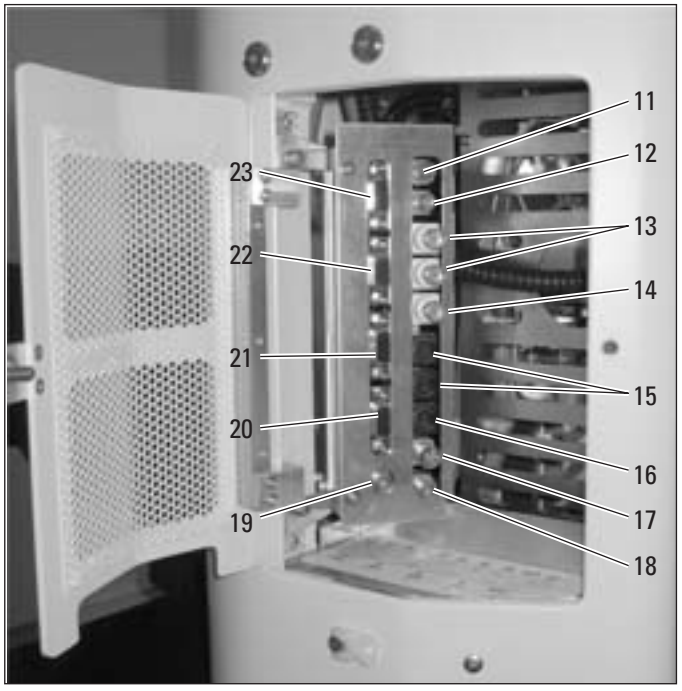
1 Touch panel
2 Push-button with illumination LED (on/off)
3 Push-button with LED for Auto Balance

Terminals

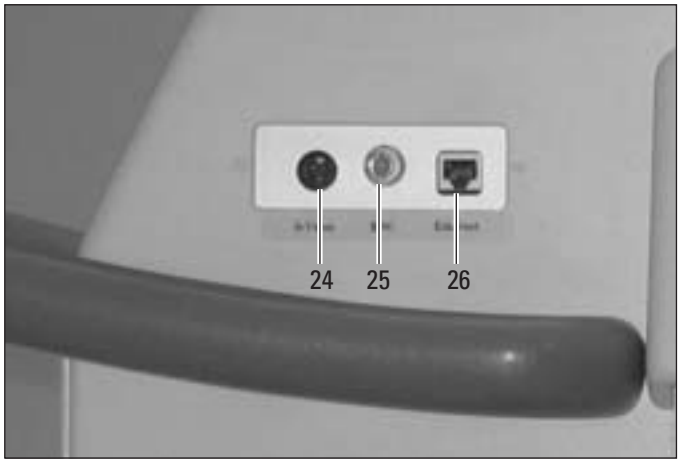


4 AD.F. Additional Function 2
5 AD.F. Additional Function 1
6 Footswitch or handswitch 2
7 Footswitch or handswitch 1
8 Internal CAN
9 External CAN
10 External CAN

AD.F. 1 and 2 are digital relay outputs that can switch 24V/2A.



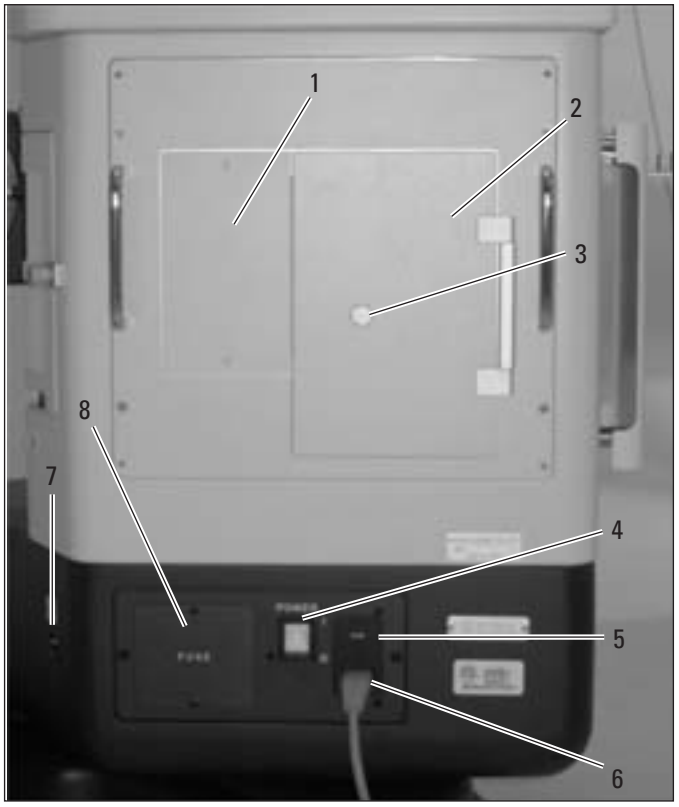
11 Storz light source
12 UV camera Hitachi
13 BNC IN (2x)
14 BNC OUT
15 S-Video IN (2x)
16 S-Video OUT
17 Storz footswitch
18 for Sony NIR camera
19 Leica MDRS3
20 SVGA IN 3
21 SVGA IN 2
22 SVGA IN 1
23 SVGA OUT to Leica DI C500



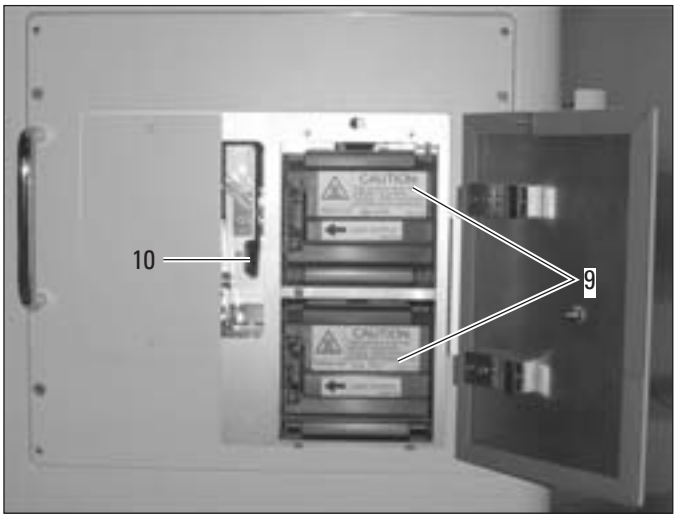
24 S-Video adapter
25 BNC adapter
26 Ethernet adapter

Terminals 24, 25 and 26 are adapters which can be used to lead out the terminals of the optional Leica MDRS3 system unit or a camera control.

Stand



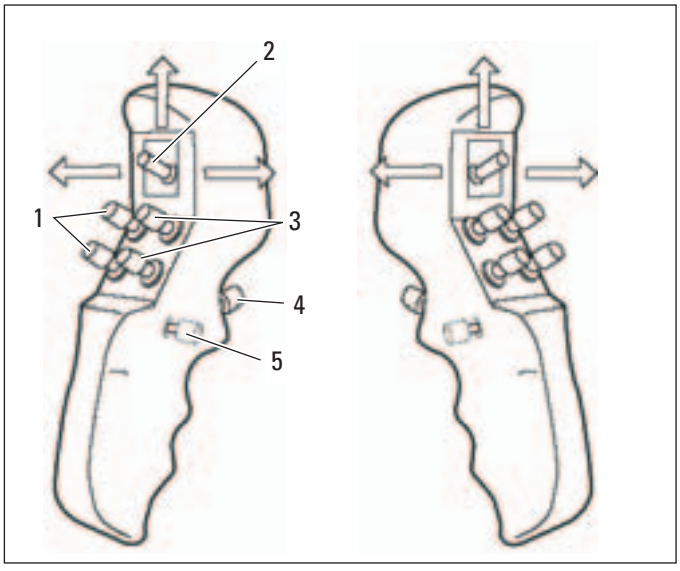
1 Illumination unit
2 Access door
3 Screw knob
4 Master switch for Leica M525 OH4 surgical microscope
5 Selector switch 100V/120V/220V/240V
6 Power supply
7 Potential equalization socket
8 Fuse box flap



9 Lamp inserts for main illumination or backup illumination
10 Lever for switching to standby illumination

The Leica M525 OH4 surgical microscope has a primary illumination source and an equivalent standby illumination source.

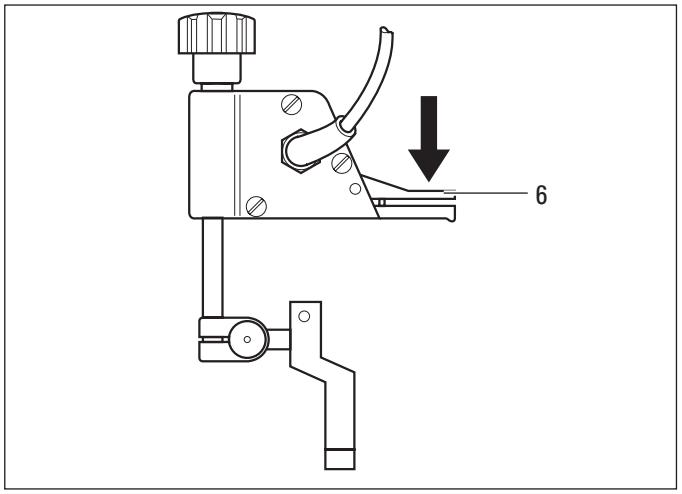
CAN handles



1 Zoom
2 4-function joystick
3 Focus
4 Release All Brakes
5 Release preselected brakes

☞ You can assign switches 1, 2, 3 and 5 of the CAN handles individually for each user in the configuration menu (see page 50).

Mouth switch



6 Release preselected brakes

Footswitch

Here you will find an overview of the footswitches which you can use to control your Leica M525 surgical microscope.

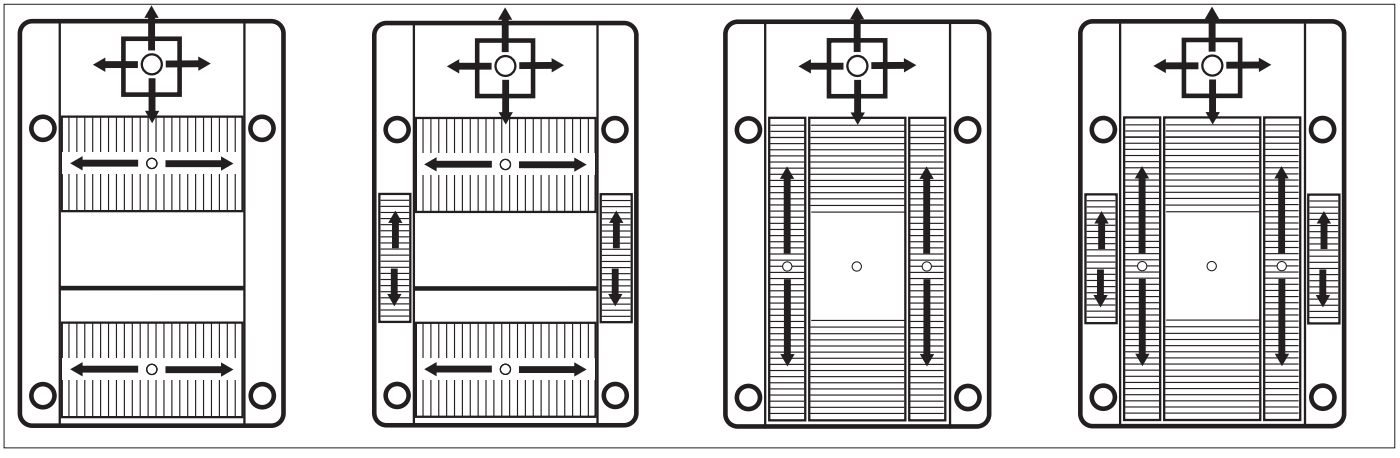
☞ Footswitches can be assigned individually for each user in the configuration menu (see page 48).

Footswitch 12 functions crosswise

Footswitch 16 functions crosswise

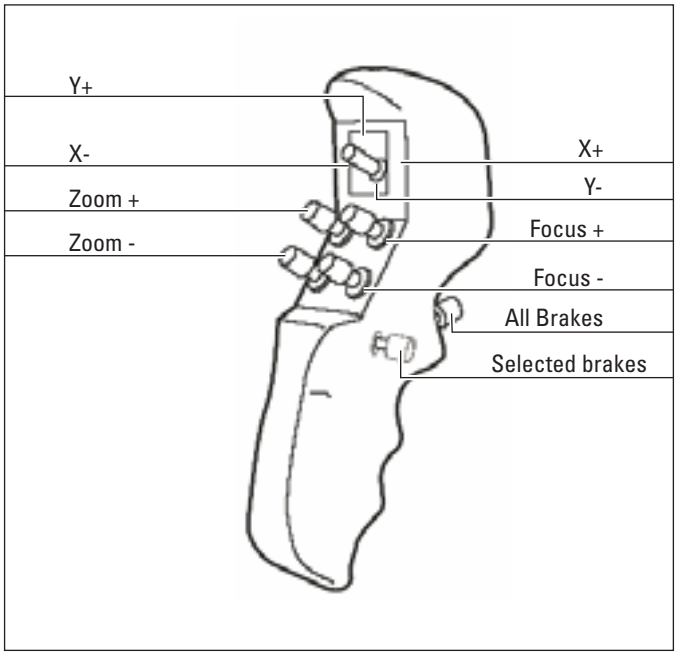
Footswitch 12 functions lengthwise

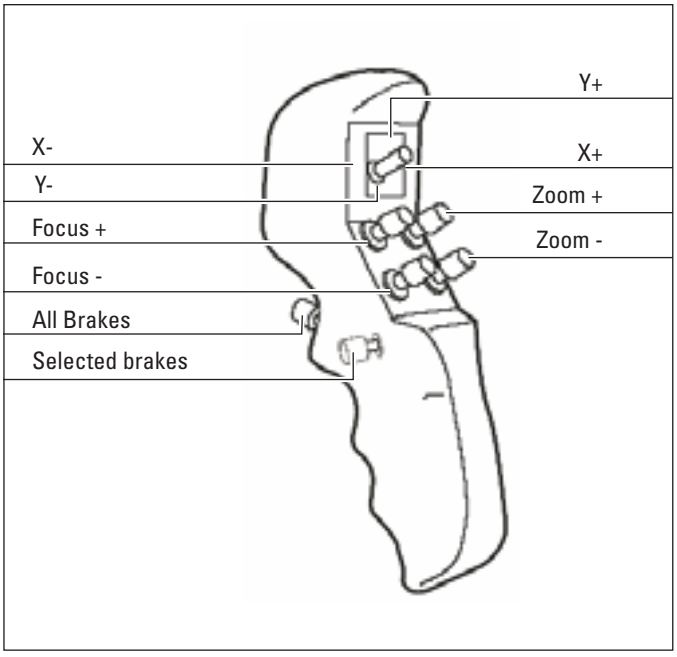
Footswitch 16 functions lengthwise

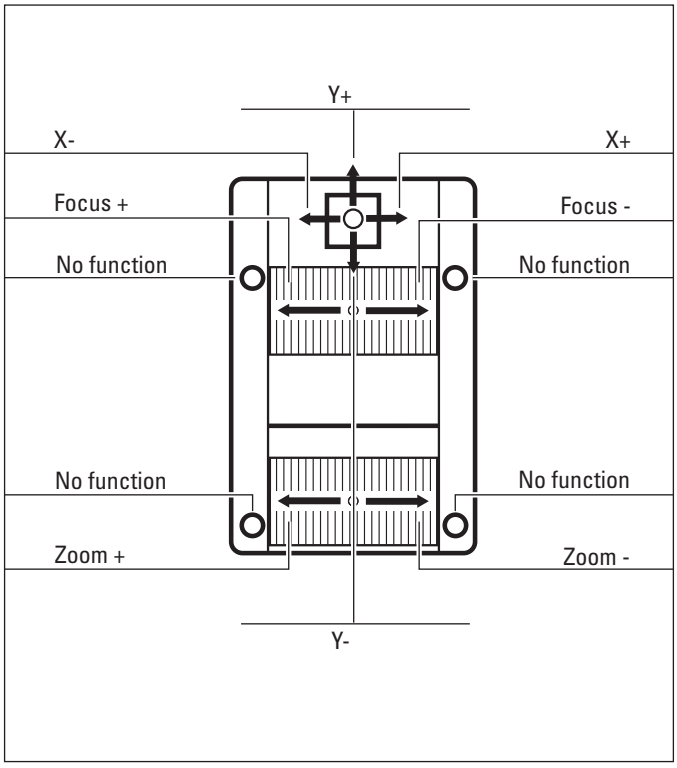


Presets "Cranial"/"Spine"/"ENT"
Here you will find an overview of the assignments of the CAN handles and an optionally connected footswitch for the preset user "Cranial"/"Spine"/"ENT".

You can assign CAN handles and footswitches individually for each user in the configuration menu (see pages 48 and 50).

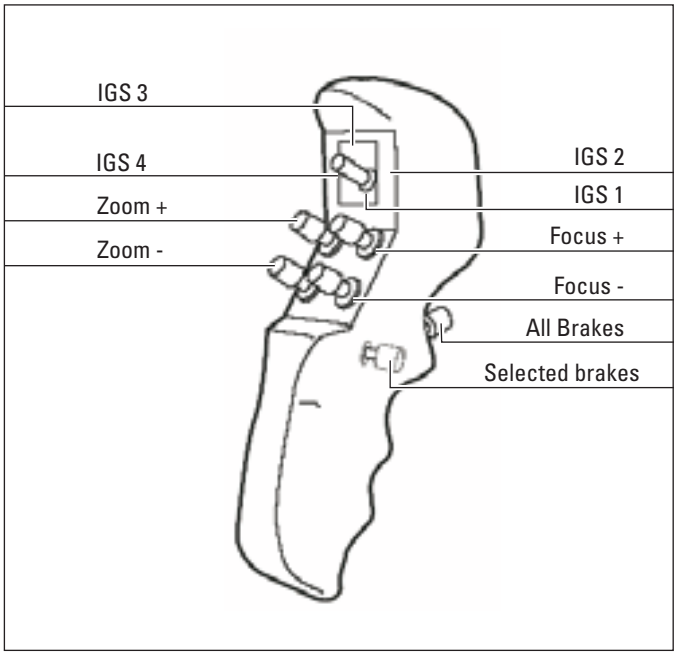


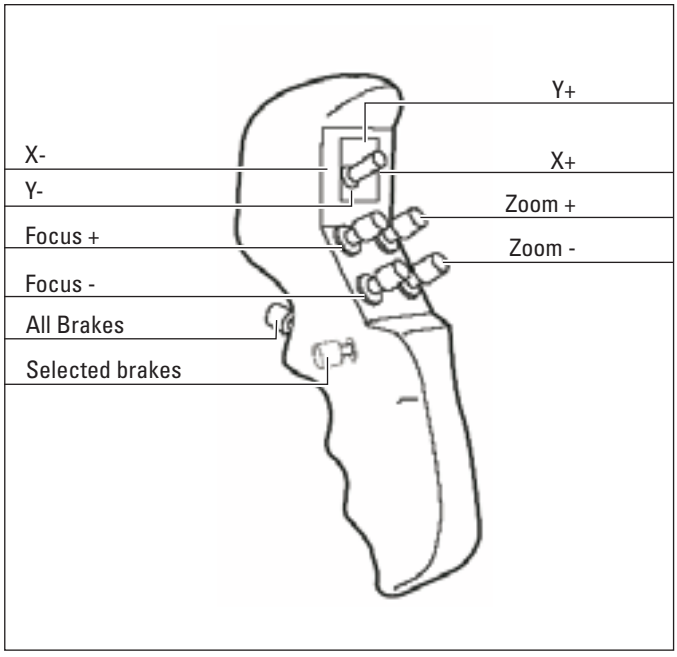


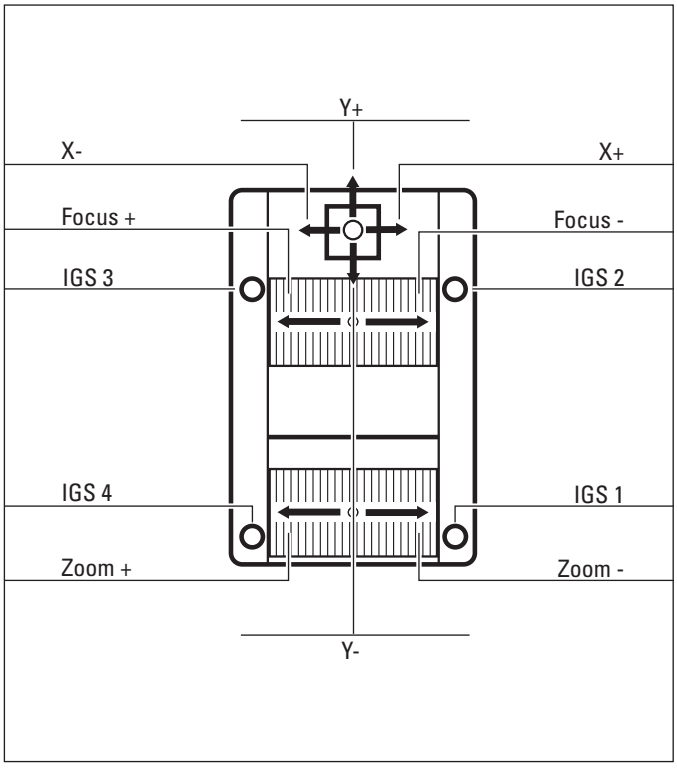


Preset "Image Injection IGS DI C500"
Here you will find an overview of the assignments of the CAN handles and an optionally connected footswitch for the preset user "Image Injection IGS DI C500".

You can assign CAN handles and footswitches individually for each user in the configuration menu (see pages 48 and 50).

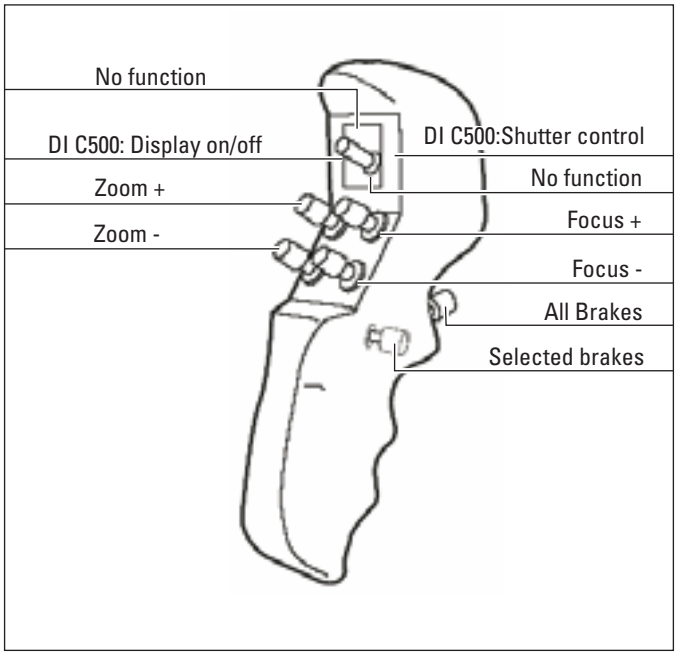


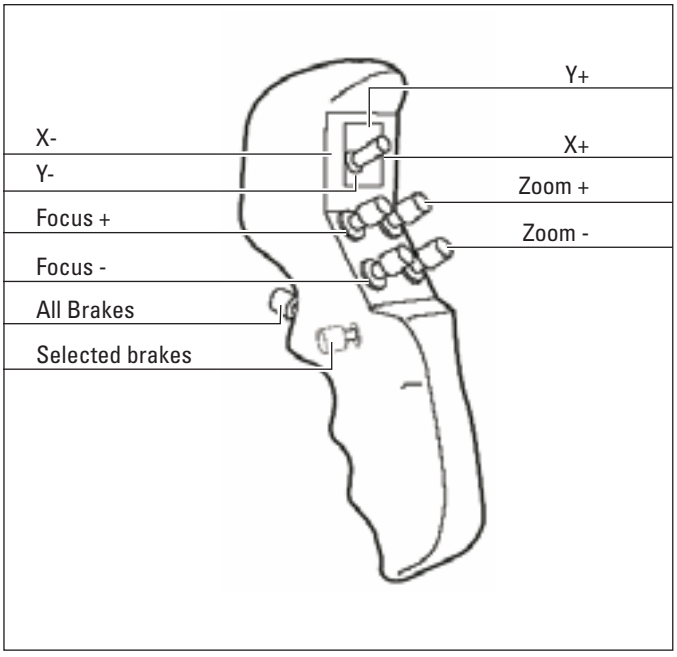


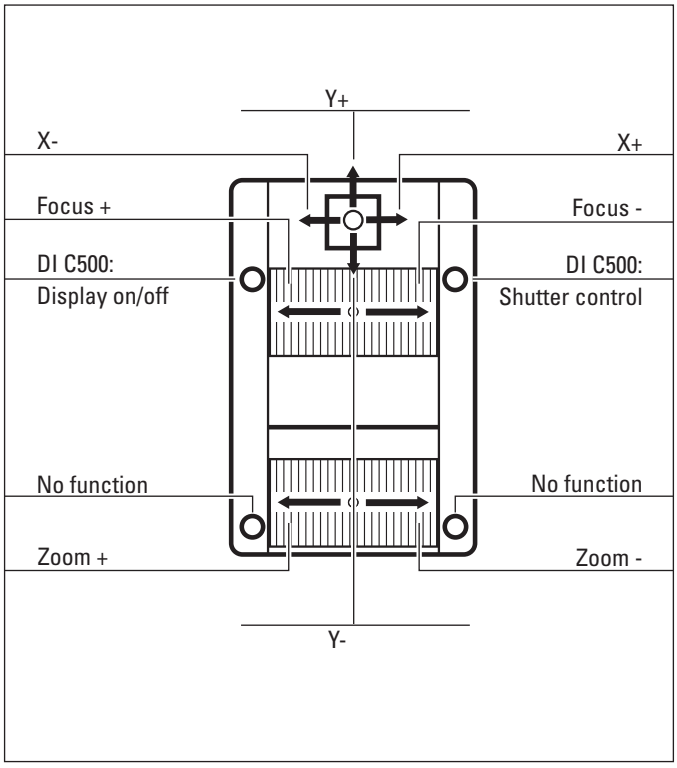


Preset "Image Injection ENDO DI C500"
Here you will find an overview of the assignments of the CAN handles and an optionally connected footswitch for the preset user "Image Injection ENDO DI C500".

You can assign CAN handles and footswitches individually for each user in the configuration menu (see pages 48 and 50).

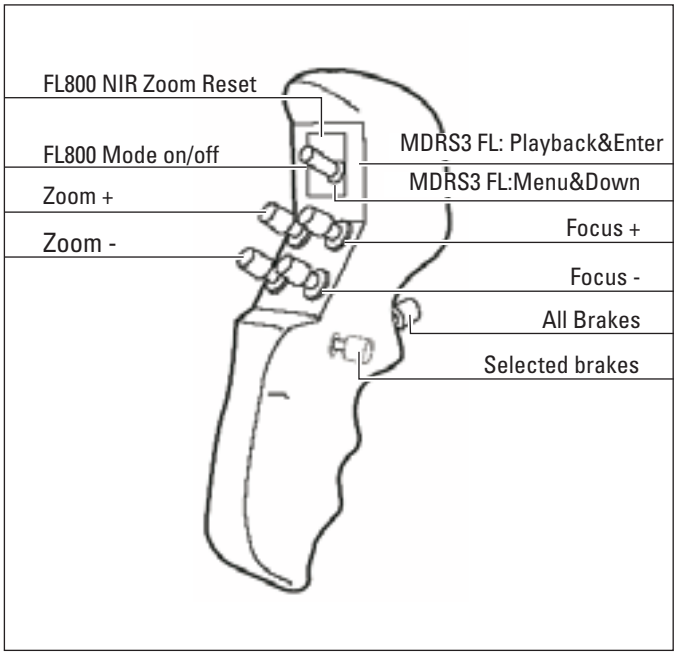


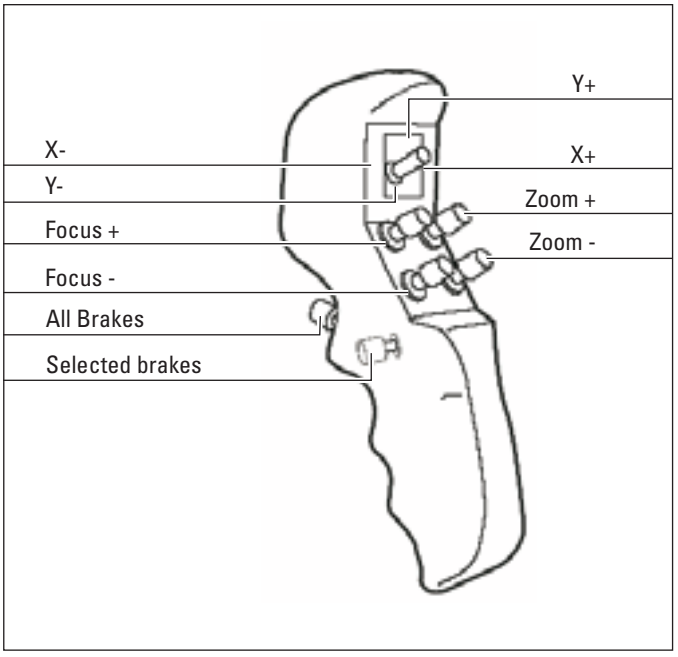


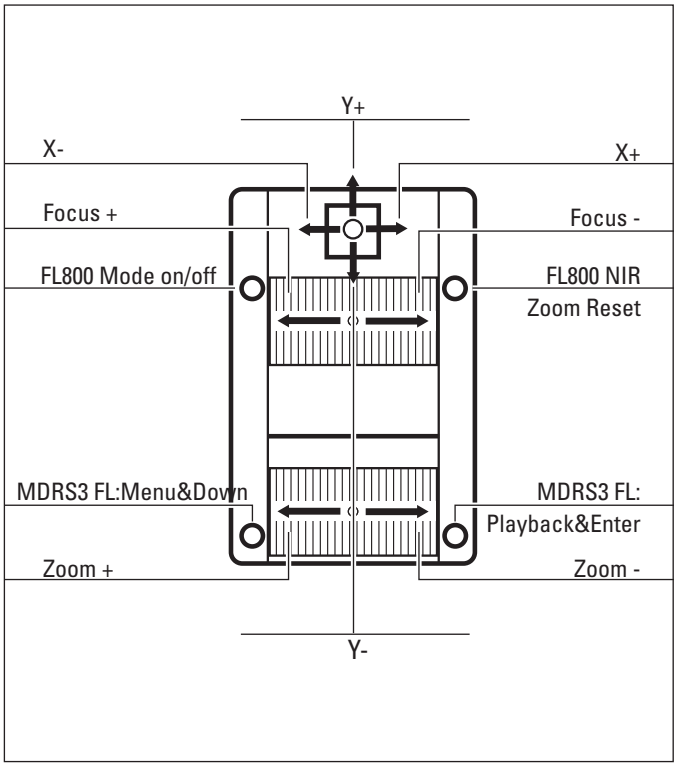


Preset "Fluorescence Vascular FL800"
Here you will find an overview of the assignments of the CAN handles and an optionally connected footswitch for the preset user "Fluorescence Vascular FL800".

You can assign CAN handles and footswitches individually for each user in the configuration menu (see pages 48 and 50).

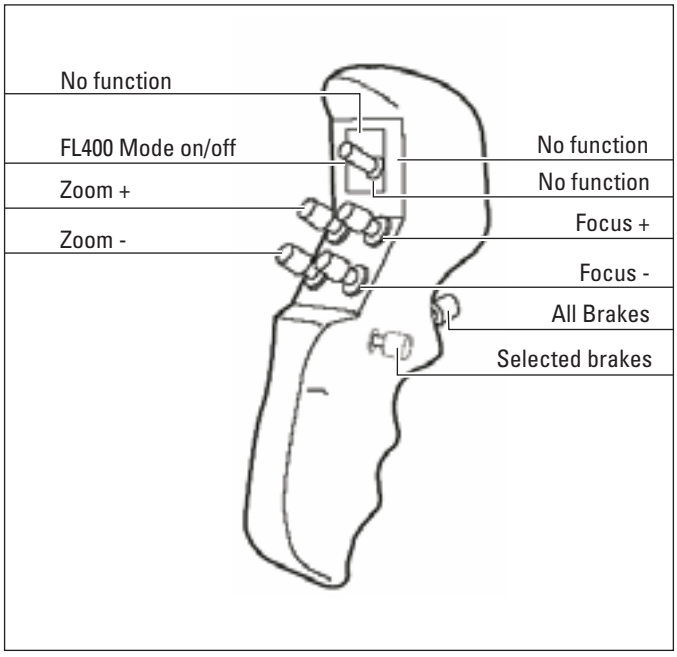


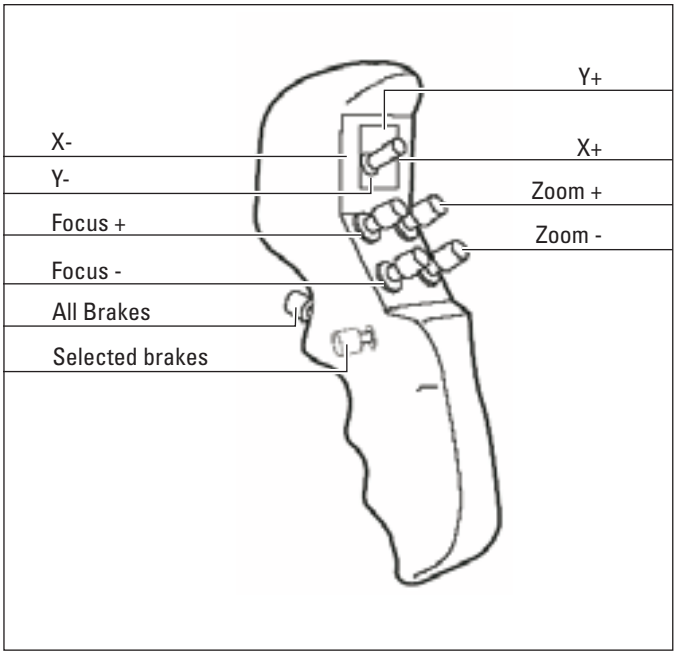


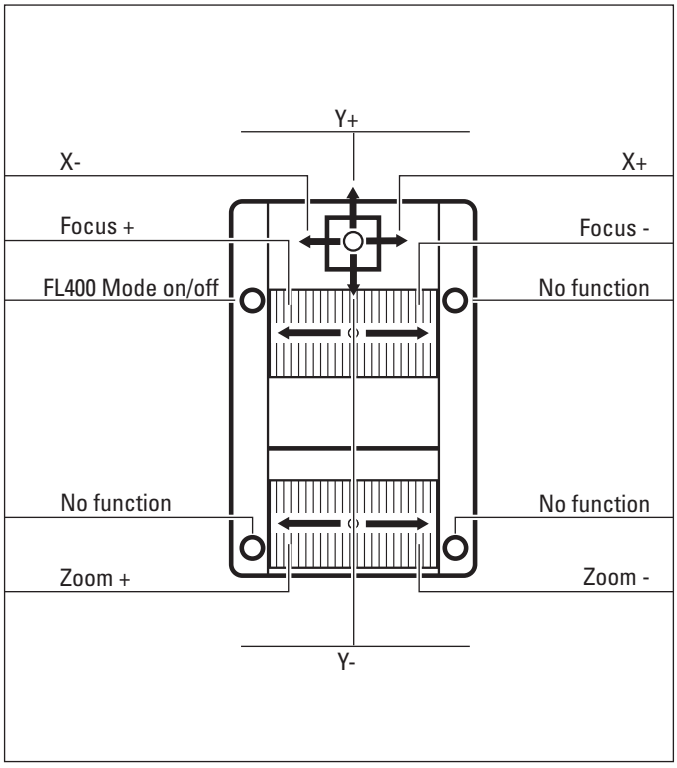


Preset "Fluorescence Oncology FL400"
Here you will find an overview of the assignments of the CAN handles and an optionally connected footswitch for the preset user "Fluorescence Oncology FL400".

You can assign CAN handles and footswitches individually for each user in the configuration menu (see pages 48 and 50).

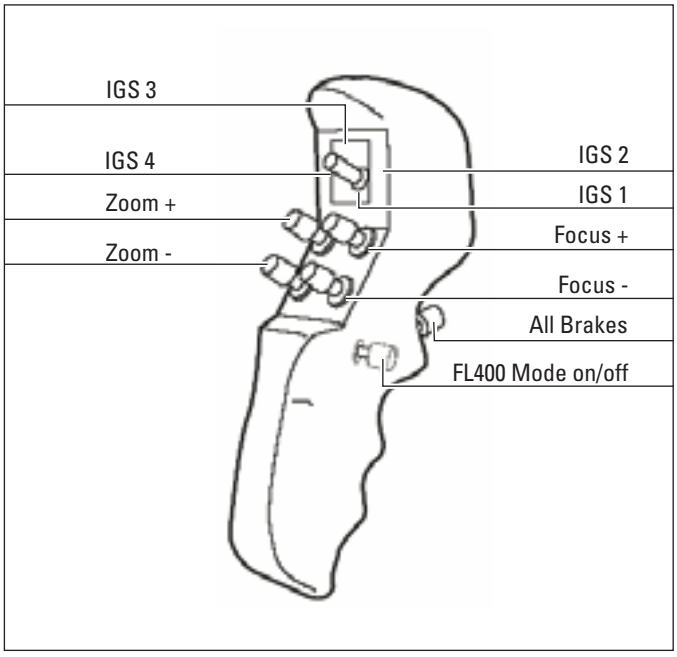


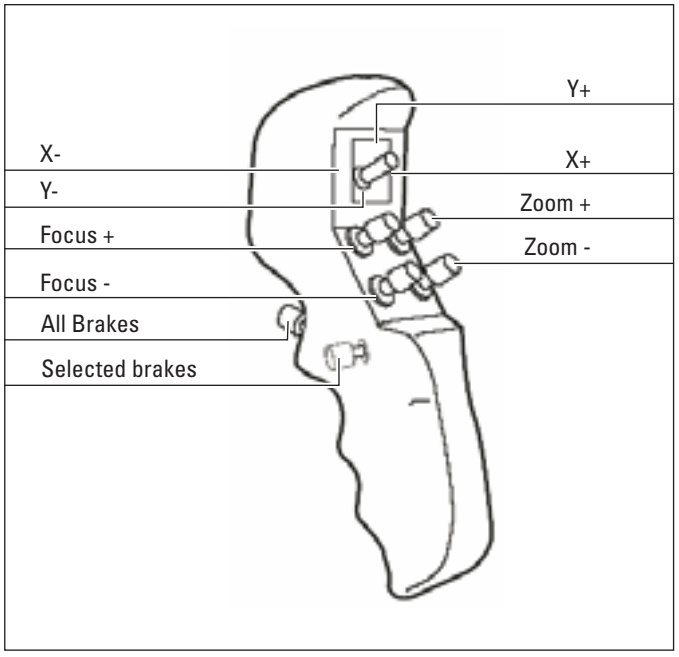


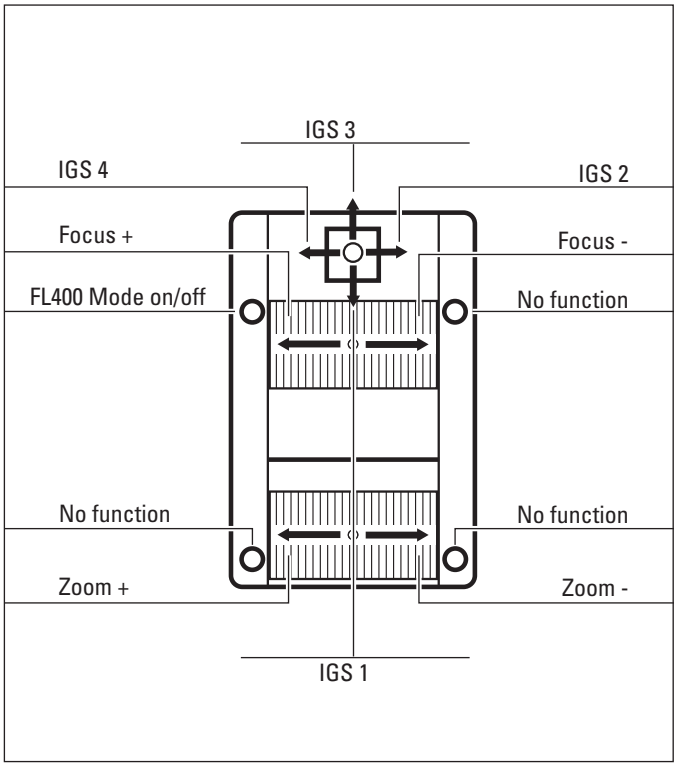


Preset "Fluorescence Oncology FL400 & IGS DI C500"
Here you will find an overview of the assignments of the CAN handles and an optionally connected footswitch for the preset user "Fluorescence Oncology FL400 & IGS DI C500".

You can assign CAN handles and footswitches individually for each user in the configuration menu (see pages 48 and 50).

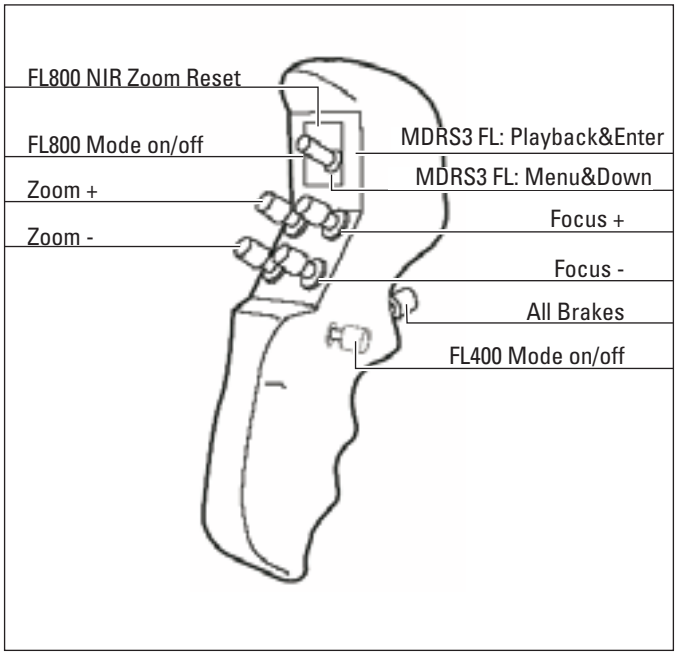


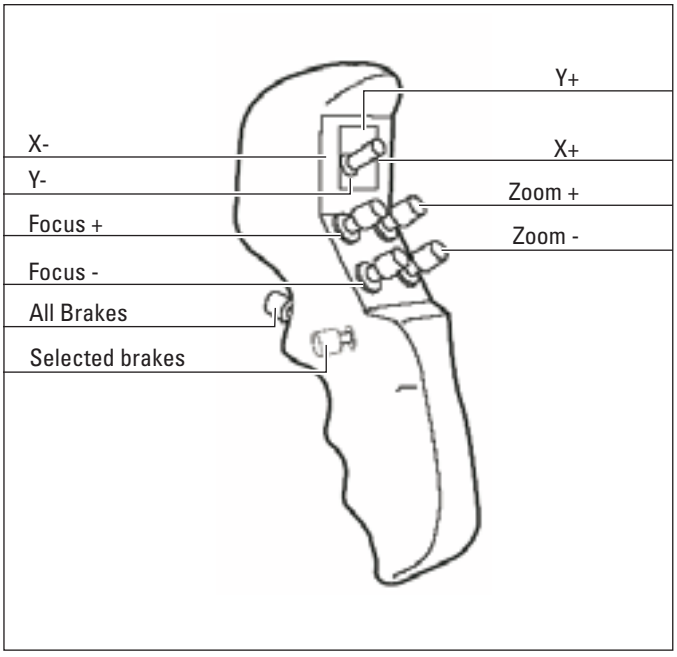


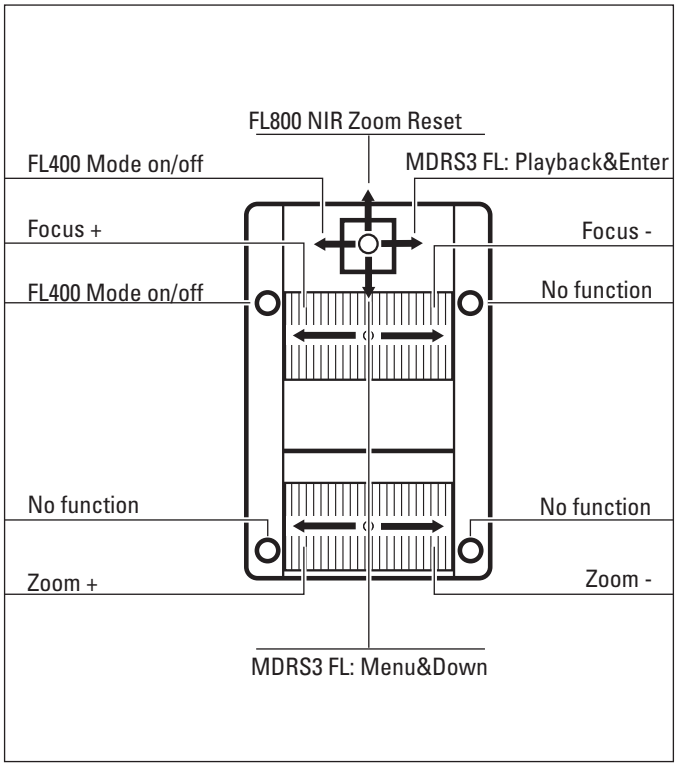


Preset "Fluorescence Oncology FL400 & Vascular FL800"
Here you will find an overview of the assignments of the CAN handles and an optionally connected footswitch for the preset user "Fluorescence Oncology FL400 & Vascular FL800".

You can assign CAN handles and footswitches individually for each user in the configuration menu (see pages 48 and 50).







A comprehensive range of accessories enables the Leica M525 OH4 surgical microscope to be matched to the requirements of the task in hand. Your Leica representative will be pleased to help you select the appropriate accessories.

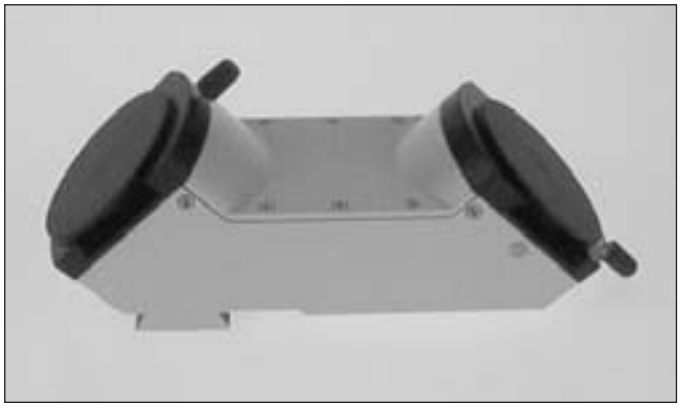
Beam splitter

- Can be used for co-observation or documentation
  Light distribution: 50% on each side (mono) or 30% / 70%

Beam splitter with counterweight

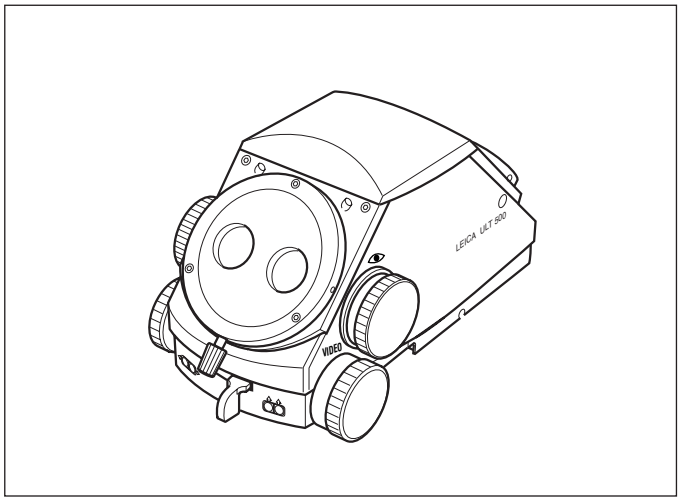
- Can be used for co-observation or documentation
  Light distribution: 50% on each side (mono)

180° second observer attachment



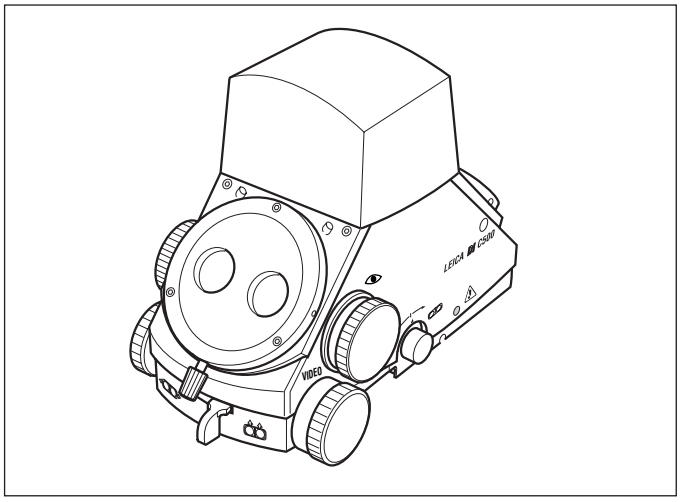
- Allows a second observer to view the procedure

Ultra Observer Leica ULT500



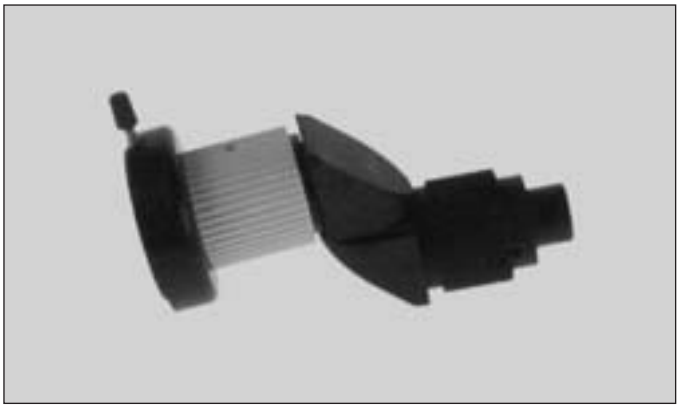
- Beam splitter with eight optical ports
- Light distribution:
  Surgeon (front) 40% (stereo)
  Assistant (rear) 40% (stereo) or
  Assistant (side) 40% (mono)
  Documentation (side) 20%

Dual Imaging Color Module Leica DI C500



- Beam splitter with eight optical ports
- Integrated color display shows data or video images.
- Light distribution:
  Surgeon (front) 40% (stereo)
  Assistant (rear) 40% (stereo) or
  Assistant (side) 40% (mono)
  Documentation (side) 20%

Stereo attachment for second observer



- Is attached to the side outputs of a beam splitter.

Tubes

Binocular tube variable from 30°–150°

- Variable viewing angles from 30° to 150°
- Adjustable viewing height
- Adjustable interpupillary distance

Binocular tube variable from 0°–180°

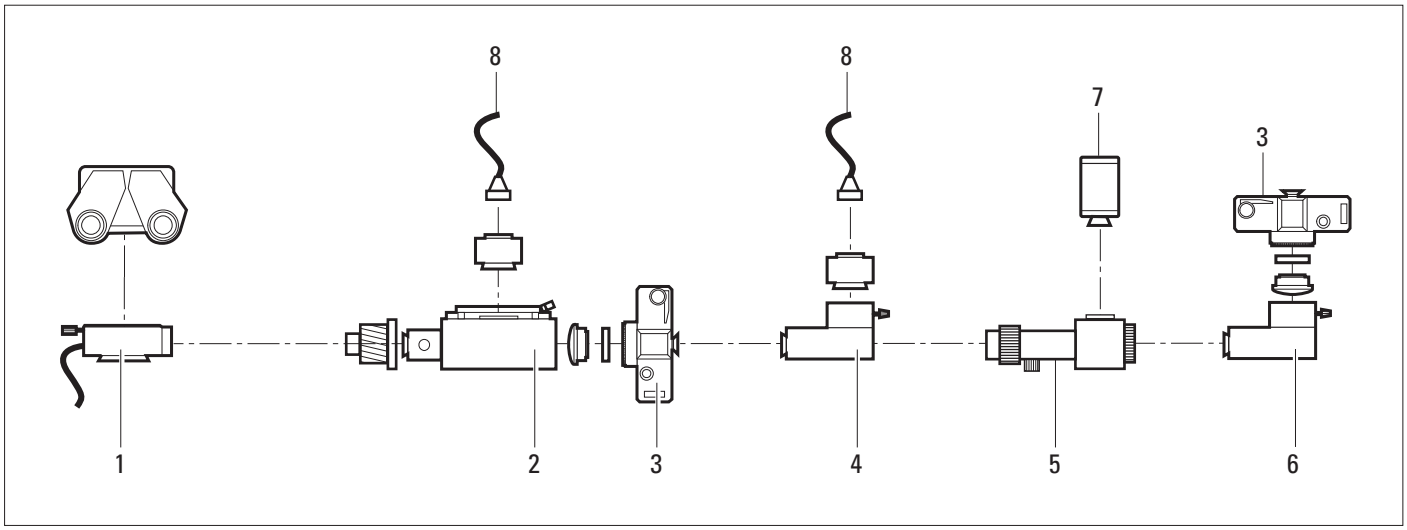
- Variable viewing angles from 0° to 180°

Inclined binocular tube

Straight binocular tube

Inclined binocular tube 45°

Video and photo accessories for Leica M525



1 Leica 2D Pick up
2 Photo/TV dual attachment
3 Photo camera
4 TV attachment
5 Zoom Video Adapter
6 Phototube
7 Video camera (such as the Leica D2D V3)
8 Leica 2D C-Mount

Leica 2D pick-up
- Video system for recording 2D video sequences.

Leica 2D C-Mount
- Video system for recording 2D video sequences.
- The camera (8) is mounted on the TV attachment or Zoom Video Adapter.

Photo/TV dual attachment
- For using a video camera with C-mount at the same time as an SLR camera.
  Complete with adapters.
- Position of video camera engageable in 45° increments.
- Video port with incorporated brightness adjustment (3 positions).

TV attachment
- For commercially-available video cameras with C-mount, complete with adapter.
- The TV attachment (4) is installed at the documentation port of the 0° assistant's attachment.
- Position of video camera engageable in 90° increments.

Zoom Video Adapter
- For commercially-available video cameras with C-mount, complete with adapter.
- The Zoom Video Adapter (5) is installed at the documentation port of the 0° assistant's attachment.
- Zoom and fine focus function for Leica Zoom Video Adapter

Phototube
- Complete with adapter, for SLR cameras.
- Adapter f = 250mm: for large fields of view and short exposure times.
- Adapter f = 350mm: for high magnifications.
- The phototube (6) is mounted on the documentation port of the 0° assistant's attachment.

Checklist: Before the operation

Cleaning the optical accessories
⇨Check the tubes, eyepieces and the documentation accessories (if used) for cleanliness.
⇨Remove dust and dirt (see page 68).

Installing accessories
⇨Lock the Leica M525 OH4 in place and install all accessories on the microscope so it is ready for use (see page 22).
⇨Position the CAN handles as required.
⇨Connect a mouth switch and/or footswitch (if used).
⇨Check the camera image on the monitor and realign if necessary.

Checking tube settings
⇨Check the tube and eyepiece setting for the selected user (see page 24).
⇨Treat the eyepieces with an antifogging compound if necessary.

Balancing
⇨Balancing the Leica M525 OH4 (see page 27).
⇨Press the "All Brakes" button on the CAN handle and check the balancing.

Function check

Warning 1
Danger of fatal electrical shock.
⇨The Leica M525 OH4 surgical microscope may be connected to a grounded socket only.

⇨Connect the power cable.
⇨Switch on the microscope.
⇨Switch on the illumination at the control unit.

Leave the illumination on for at least 5 minutes, as otherwise luminosity will decrease rapidly.

⇨Replace defective bulbs before the operation begins.
⇨Test all functions on the CAN handles and on the footswitch.
⇨Check the user settings on the control unit for the selected user (see page 45).

Positioning at the OP table
⇨Position the surgical microscope on the OP table as required, and lock the footbrake (see page 35).

Sterility
⇨Fit sterile components and sterile drape if used (see page 36).

Warning 2
Danger of fatal electric shock
⇨Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

Installing optical accessories

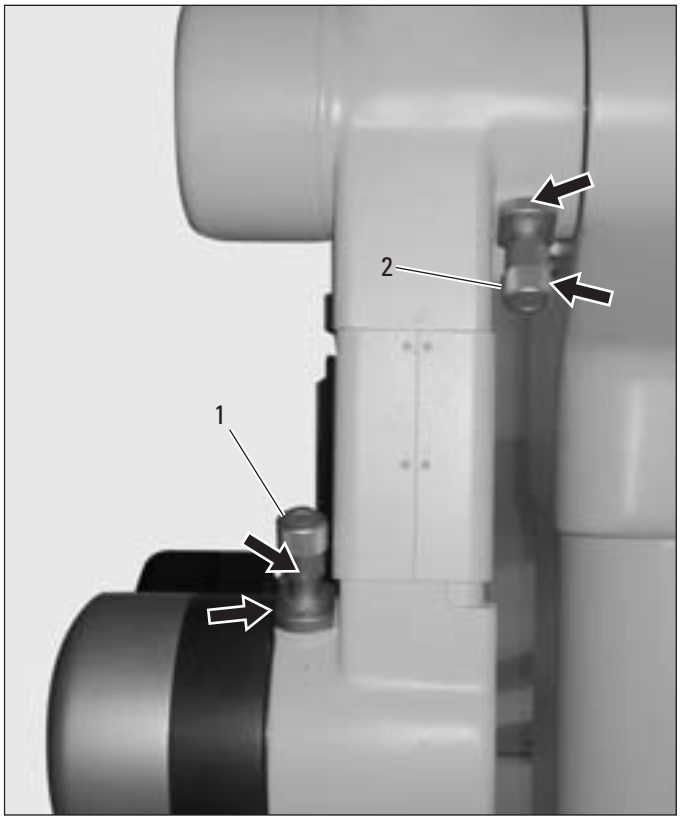
Warning 3
Risk of injury through surgical microscope moving down!

- ⇨Complete all preparations and adjustments to the stand before the operation.
- ⇨Never balance or re-equip the instrument over the field of operation.
- ⇨Always lock the Leica M525 OH4 in position before re-equipping it.
- ⇨Balance the Leica M525 OH4 after re-equipping it.
- ⇨Do not release the brakes when the instrument is in an unbalanced state.

Locking the Leica M525 OH4 in position

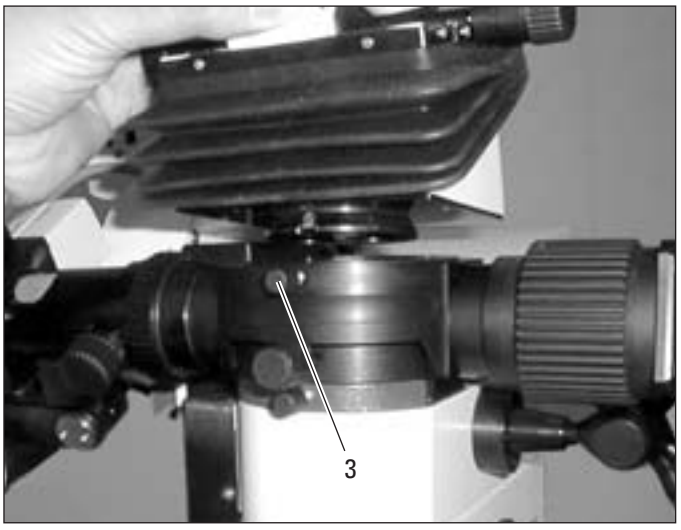
The D-axis of the Leica M525 OH4 is locked in position with the locking device.
The locking device is principally for installation and re-equipping the Leica M525 OH4.

⇨Pull out the locking buttons (1 and 2) and turn them until the two points (arrows) are aligned above each another.



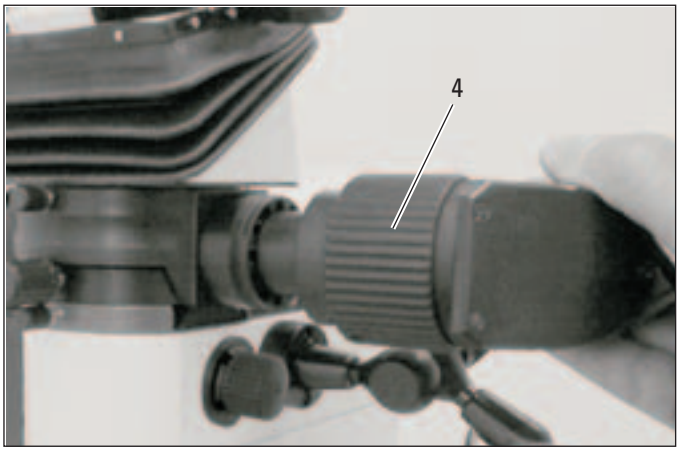
⇨Move the swing arm up and down until locking device (1) engages.
⇨Move the swing arm back and forth until locking device (2) engages.

Installing the 90° stereo attachment, binocular tube and beam splitter



⇨Release the clamping screw (3).
⇨Insert the accessories into the dovetail ring from above.
⇨Tighten the clamping screw (3).

Installing the stereo attachment for second observer

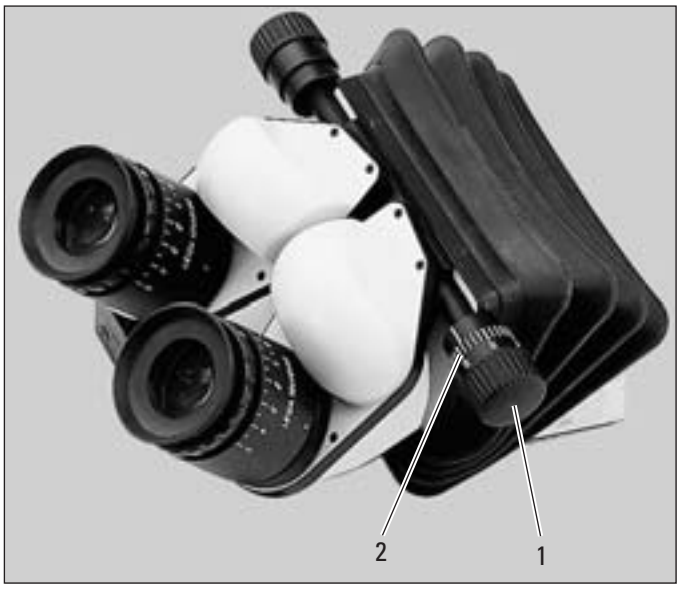


⇨Insert the stereo attachment and check whether the connection has engaged.
⇨Tighten the locknut (4) by hand.
⇨Align the attachment for second observer as required.

Setting the tube

Set the interpupillary distance

Adjust the interpupillary distance to a value between 55mm and 75mm.

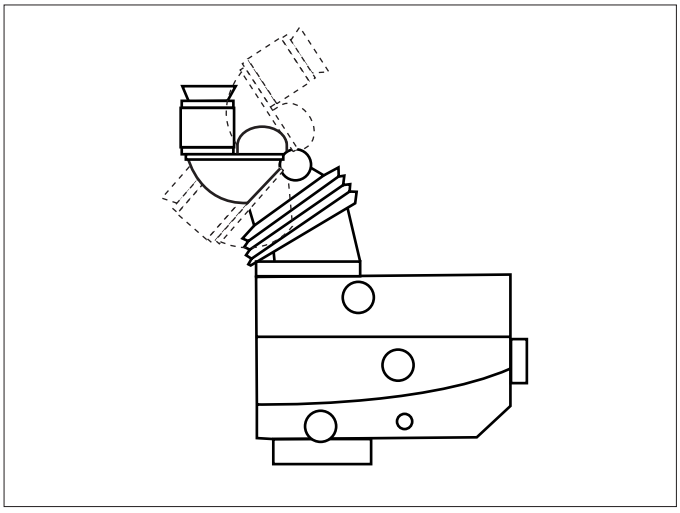


⇨Using the adjusting wheel (1), set the interpupillary distance such that a circular image field can be seen.

This procedure has to be performed only once for each user. The acquired value (2) can be stored for each user on the "User Settings" menu screen under "Tube Settings" (see page 51).

Adjusting the tilt

⇨Hold the tube with both hands.
⇨Tilt the tube up or down.



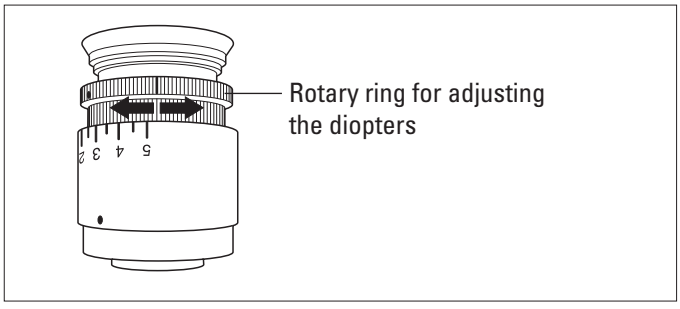
Setting the eyepiece

Determine/set the diopters for the user

The individual diopters can be adjusted continuously for each eyepiece from +5 to -5. Only this method will ensure that the image will stay in focus within the entire zoom range = parfocal. The treatment microscope ensures a high degree of fatigue resistance when the diopter setting is correct for both eyes.

A parfocal adjusted microscope ensures that the assistant´s view and monitor image will always remain sharp.

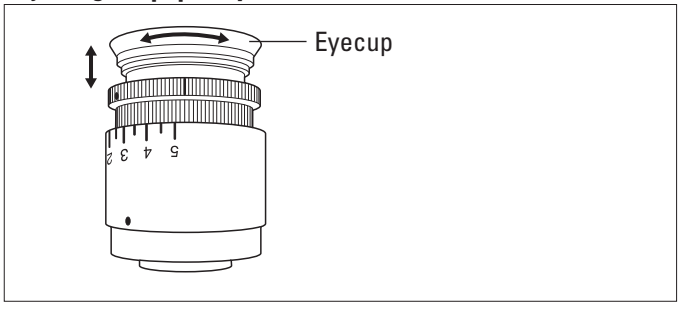
⇨Set to the minimum magnification.
⇨Place a flat test object with sharp contours under the lens at working distance.
⇨Focus the microscope.
⇨Set to the maximum magnification.
⇨Focus the microscope.
⇨Set to the minimum magnification



⇨Without looking into the eyepieces, turn both eye lenses to +5 diopters.
⇨Slowly turn the eyepieces towards -5 individually for each eye until the test object appears sharp.
⇨Select the highest magnification and check the sharpness.

This procedure has to be performed only once for each user. The acquired values can be stored for each user on the "User Settings" menu screen under "Tube Settings" (see page 51).

Adjusting the pupillary distance



⇨Rotate the eyecups up or down until the desired distance is set.

Checking parfocality

⇨Place a flat test object with sharp contours under the lens at working distance.
⇨Zoom through the whole range, observing the test object.
The image sharpness must remain constant at all magnifications. If this is not the case, check diopter settings of the eyepieces.

Installing documentation accessories

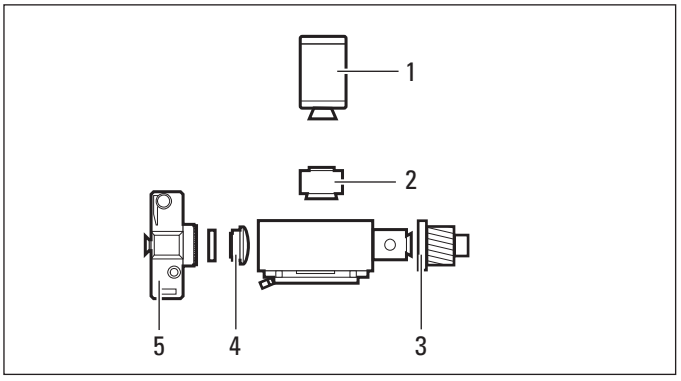
Fitting the Leica 2D

See user manual Leica 2D (10708979).

Fitting the photo/TV dual attachment

⇨Install the dual attachment on the beam splitter.
⇨Equip the video camera (1) with the TV objective (2) and insert into the dual attachment.
⇨Tighten the clamping screw.
⇨Loosen the clamping screw and engage the video camera until it engages in one of the 45° increments depending on the available space.
⇨Tighten the clamping screw.

⇨Equip the photo camera (5) with camera adapter (4).
⇨Screw the photo lens onto the camera adapter (4).
⇨Fit the camera to the dual attachment.
⇨Tighten the clamping screw.



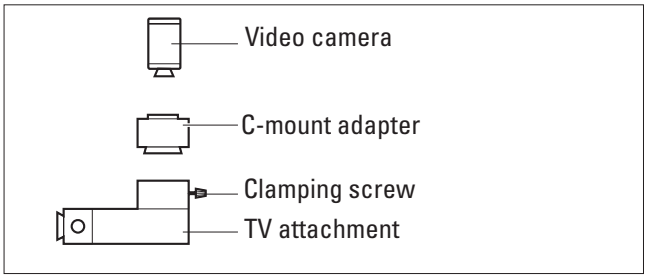
1 Video camera
2 TV lens
3 Adapter M600 to M500 interface
4 Camera adapter
5 Photo camera and photo lens

The object image at the camera output is laterally reversed!

Using the dial, the brightness of the video can be adjusted to 30%, 50% or 100%. One of these filters can be switched with the 8% filter provided. To do so, remove the camera and change the filter in the TV output.

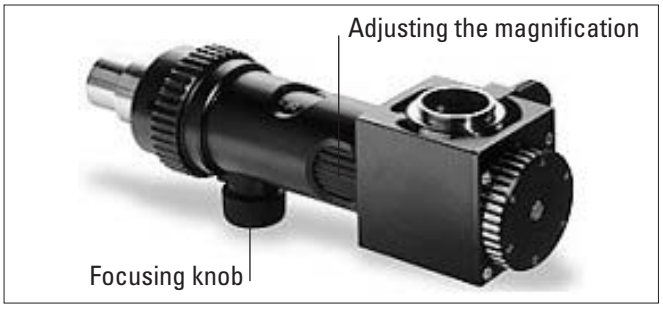
TV attachment / zoom video adapter

⇨Mount the TV attachment on the documentation port of the beam splitter.
⇨Screw the adapter to the camera using the C-mount.
⇨Insert the camera with the adapter into the TV attachment and tighten the clamping screw.



90° click-stop (TV attachment only):
⇨Loosen the clamping screw.
⇨Engage the camera at one of the 90° increments in accordance with the space available and tighten the clamping screw.

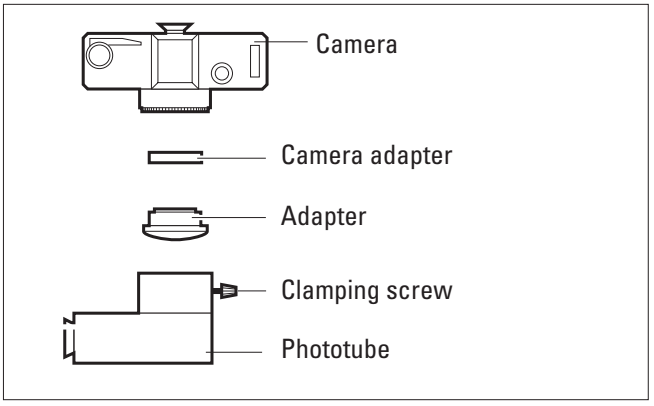
Setting the Zoom Video Adapter parfocal:
⇨Set to the maximum magnification.
⇨Place a flat test object with sharp contours under the objective.
⇨Look through the eyepieces and focus the microscope.
⇨Set to the minimum magnification.
⇨Set the maximum magnification (f=100) on the Zoom Video Adapter.
⇨Focus the monitor image on the Zoom Video Adapter.



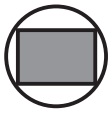
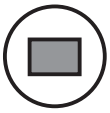
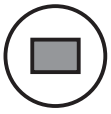
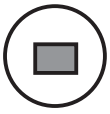
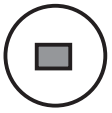
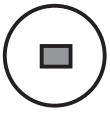
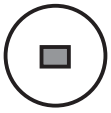
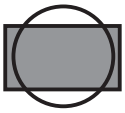
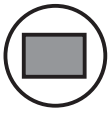
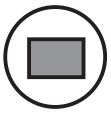
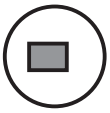
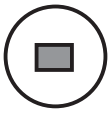
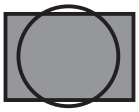
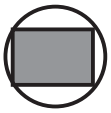
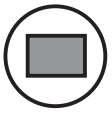
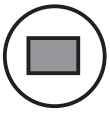
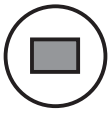
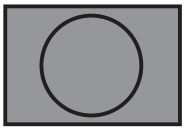
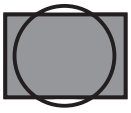
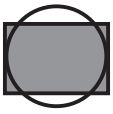
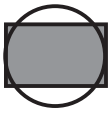
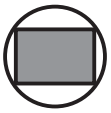
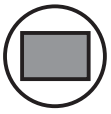
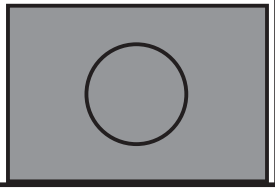
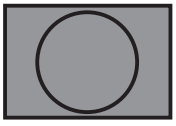
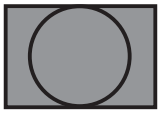
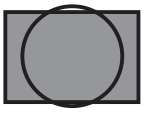
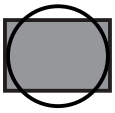
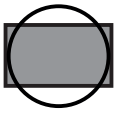
⇨Set the desired magnification on the Zoom Video Adapter.

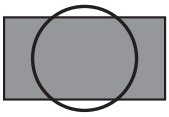
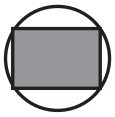
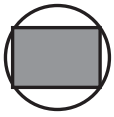
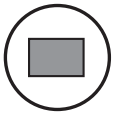
Fitting the phototube

⇨Mount the phototube on the beam splitter.
⇨Secure the camera adapter to the SLR camera.
⇨Connect the f = 250mm or f = 350mm adapter to the camera adapter.
⇨Secure the camera, complete with adapter, in the phototube.
⇨Tighten the clamping screw.



Selecting documentation accessories

	Zoom video adapter 35mm	TV attachment 55mm	PhotoTV dual attachment 60mm	TV attachment 70mm	PhotoTV dual attachment 85mm	Zoom video Adapter 100mm	TV attachment 107mm
1/4 “							
1/3 “							
1/2 “							
2/3 “							
1 “							

	Photo/TV dual attachment 250 mm	350 mm
35 mm		
Digital Photo Camera		

Field of view

Monitor/image

Stand settings

Automatic balancing of the Leica M525 OH4

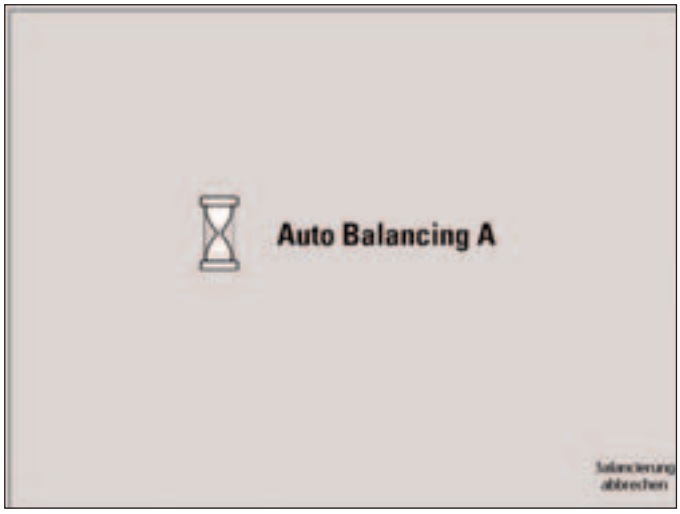
Warning 5
Danger of injury due to movement of the microscope during the balancing process.
⇨Do not stand next to the microscope during the balancing process.

Warning 6
Danger of injury due to the Leica M525 OH4 surgical microscope moving down.
⇨Never balance or re-equip the instrument over the field of operation.
⇨Balance the Leica M525 OH4 surgical microscope after re-equipping it.
⇨Do not release the brakes when the instrument is in an unbalanced state.
⇨Never perform intraoperative AC / BC balancing over the patient.

⇨Switch on the Leica M525 OH4.
⇨Install the accessories in the permitted weight range (see Technical data, screen 80).
⇨Align the accessories in the working position.
⇨Press the "All Brakes" button on the CAN handle and move the optical carrier into the A-position.
The mark (1) musty be pointing to A.

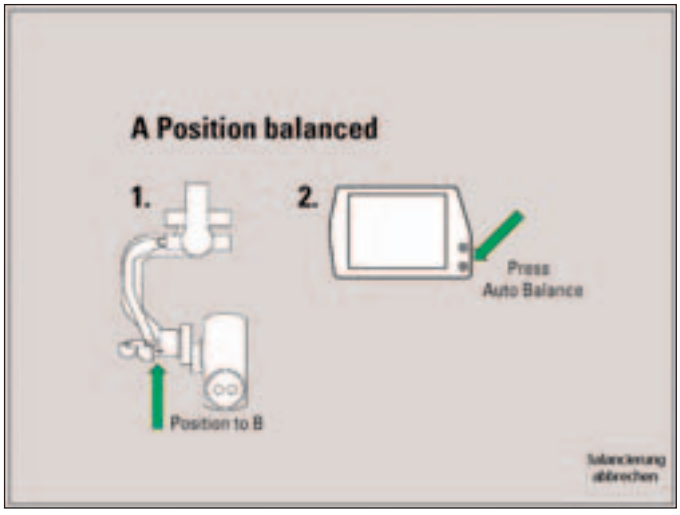
⇨Press the autobalancing push-button (3) on the control unit.
During the balancing procedure, the push-button (2) flashes green and an acoustic signal sounds (can be deactivated in the service menu).

The following dialog window opens on the touch panel monitor:

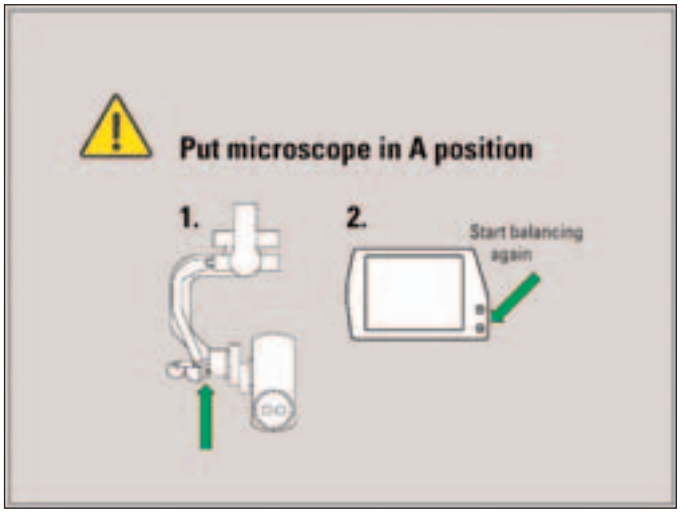


The balancing procedure can be canceled at any time using "Interrupt Balancing".

The first balancing step is complete when the acoustic signal no longer sounds and the push-button (2) is no longer flashing.

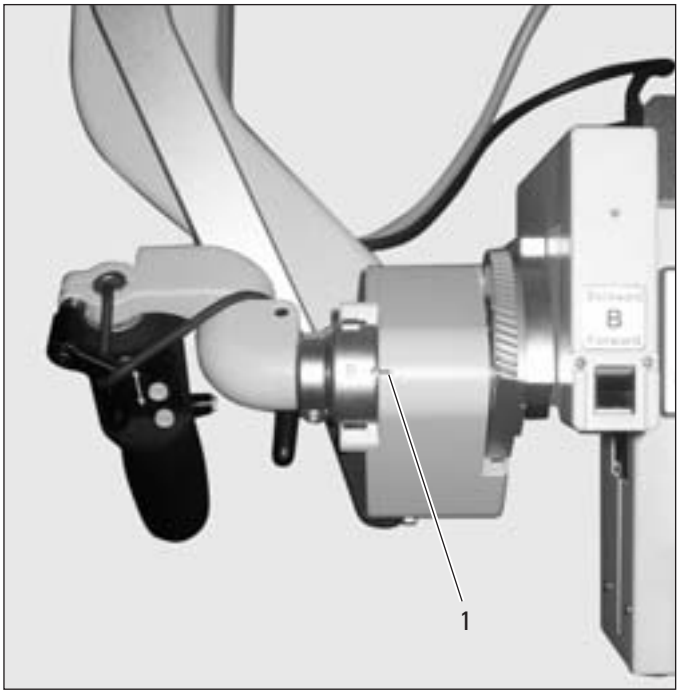


If automatic balancing cannot be successfully completed, the following dialog window opens:



⇨Acknowledge with the "Close" button.
⇨Correct the alignment of the optical carrier (A-position).
⇨Press push-button (2).
Autobalancing re-starts.

⇨Press the "All Brakes" button on the CAN handle, tilt the optical carrier forwards 90° and move it into the B-position. The mark (1) must be pointing towards B.



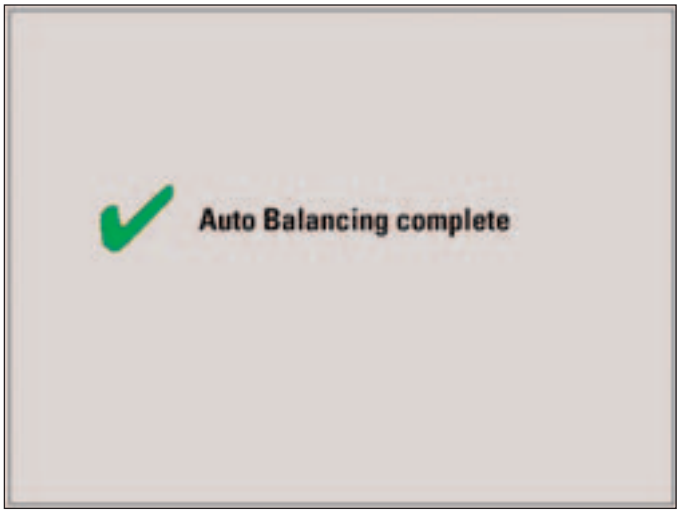
If the mounted accessories (e. g. the assistant's tube) do not allow a 90° tilt movement, turn the tube upwards, tilt the optical carrier forwards and move the tube back into its working position.

⇨Press the autobalancing push-button (2) on the control unit again.
During the balancing procedure, the push-button (2) flashes yellow and an acoustic signal sounds (can be deactivated in the service menu).

⇨The following dialog window opens on the touch panel:

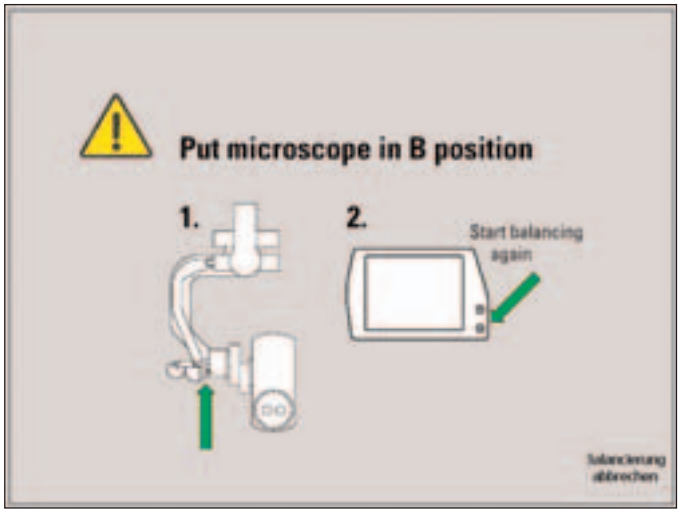
☞ The balancing procedure can be canceled at any time using "Interrupt Balancing".

⇨Balancing is complete when the acoustic signal no longer sounds and the push-button (2) is no longer flashing.
A dialog window indicates that balancing has been completed.



⇨Press the "Close" button or wait until the dialog window is closed automatically after 5 seconds.
⇨Check the balancing.
⇨Press the "All Brakes" button on the CAN handle and position the microscope.
The microscope must remain fixed in any position.

If automatic balancing cannot be successfully completed, the following dialog window opens:



⇨Acknowledge with the "Close" button.
⇨Correct the alignment of the optical carrier (B-position).
⇨Press the push-button (2).
Autobalancing re-starts.

Intraoperative balancing

Warning 4
Danger of injury due to movement of the microscope during the balancing process.
⇨Do not stand next to the microscope during the balancing process.

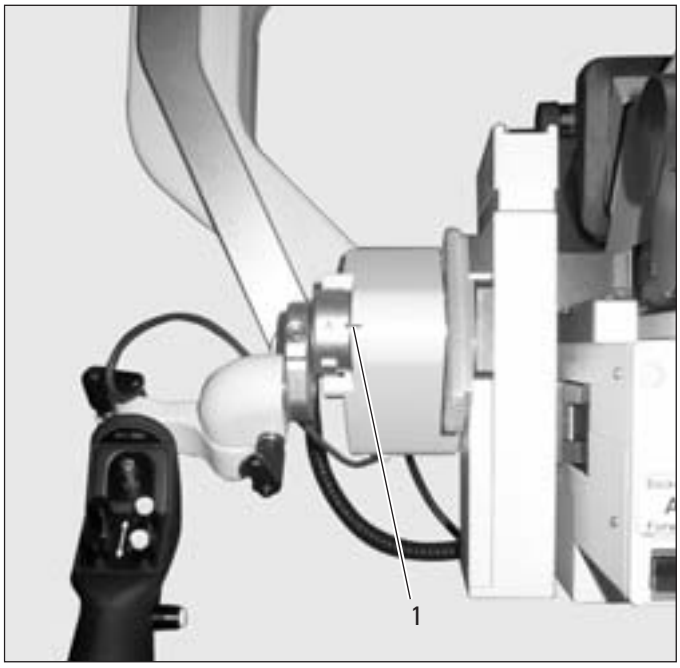
Warning 5
Danger of injury due to swinging down of the Leica M525 OH4 surgical microscope.
⇨Never balance or re-equip the instrument over the field of operation.
⇨Balance the Leica M525 OH4 surgical microscope after re-equipping it.
⇨Do not release the brakes when the instrument is in an unbalanced state.

Intraoperative AC/BC balancing allows re-balancing during the operation. Re-balancing may be necessary if, for instance, an assistant's tube is adjusted.
Either axes A and C or B and C can be balanced.

For best results, it is recommended to balance axes A and C before balancing axes B and C.

A/C balancing

If work is performed only in the horizontal microscope position, re-balancing of the A/C axes may be sufficient.
⇨Press the "All Brakes" button on the CAN handle and move the optical carrier into the A-position.
The mark (2) must be pointing towards A.

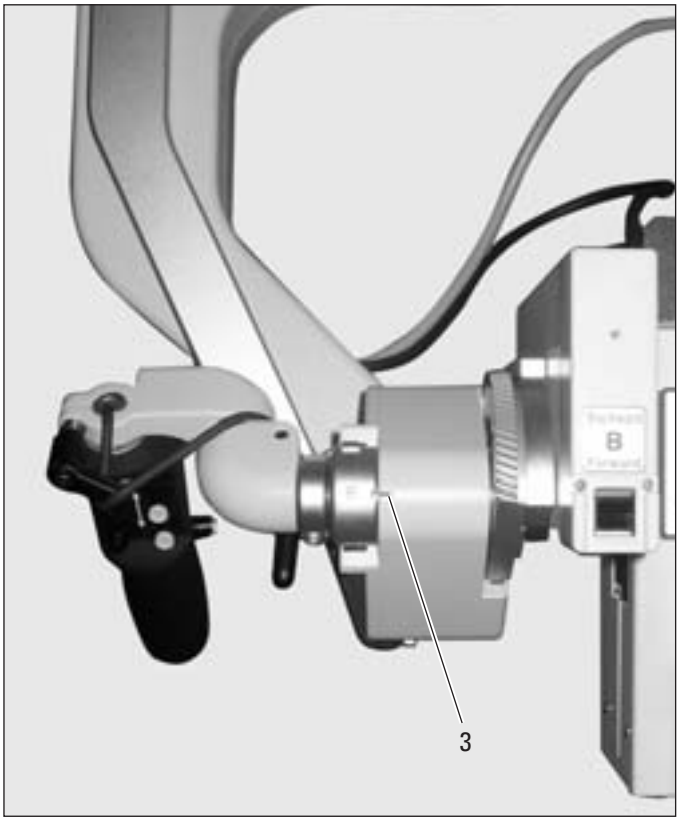


⇨Press the start button for automatic AC/BC balancing on the swing arm.
During the balancing procedure, the push-button (2) on the control unit flashes green and an acoustic signal sounds.

The A-axis is balanced first, followed by the C-axis.

B/C balancing

If work is performed only in the upright microscope position, re-balancing of the B/C axes may be sufficient.
⇨Press the "All Brakes" button on the CAN handle and move the optical carrier into the B-position.
The mark (3) must be pointing towards B.



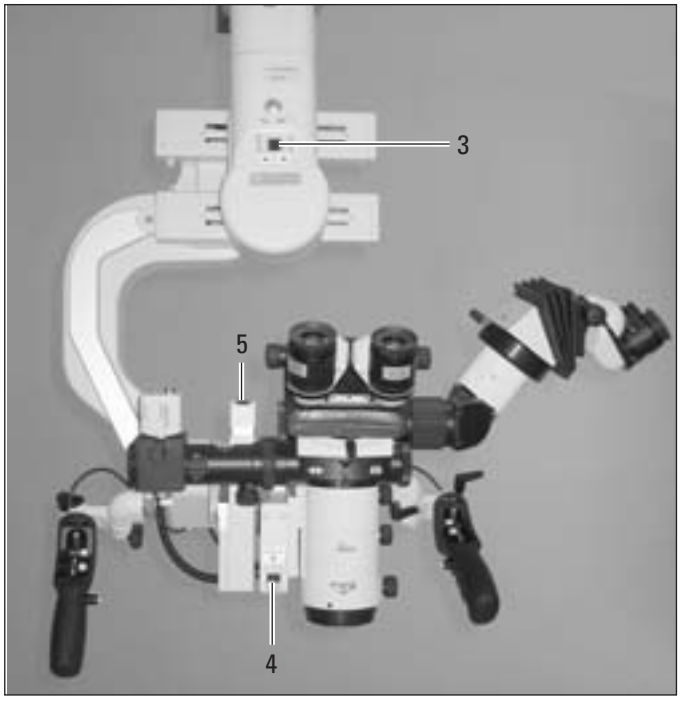
⇨Press the start button (1) for automatic AC/BC balancing on the swing arm.

During the balancing procedure, the push-button (2) on the control unit flashes yellow and an acoustic signal sounds.

The B-axis is balanced first, followed by the C-axis.
⇨Check the balancing.
⇨Press the "All Brakes" button on the CAN handle and position the microscope.
The microscope must remain fixed in any position.
⇨Correct the balancing, if necessary.

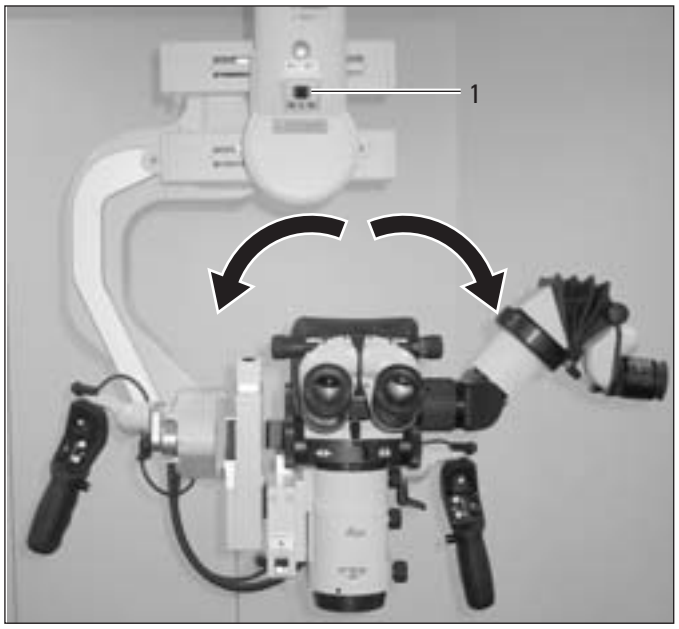
Correcting the balancing manually

For manual balancing, the axes can be moved manually using switches (3), (4) and (5).



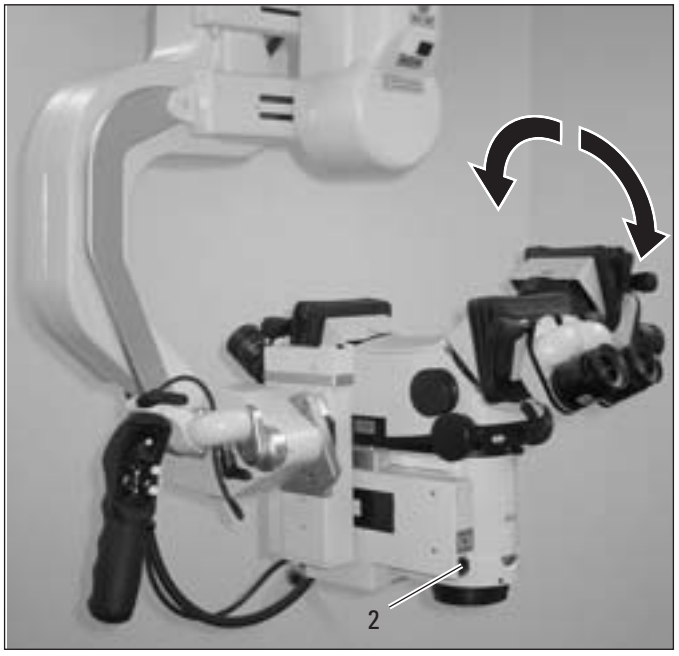
Make sure that no accessories collide with the microscope during manual balancing.

⇨Check the balancing.
⇨Press the "All Brakes" button on the CAN handle.



The optical carrier tilts to the right:
⇨Move the C-axis to the left with switch (1) until the optical carrier is balanced.

The optical carrier tilts to the left:
⇨Move the C-axis to the right with switch (1) until the optical carrier is balanced.



The optical carrier (in the A-position) tilts back:
⇨Move the A-axis forwards with switch (2) until the optical carrier is balanced.

The optical carrier tilts forwards:
⇨Move the A-axis back with switch (2) until the optical carrier is balanced.

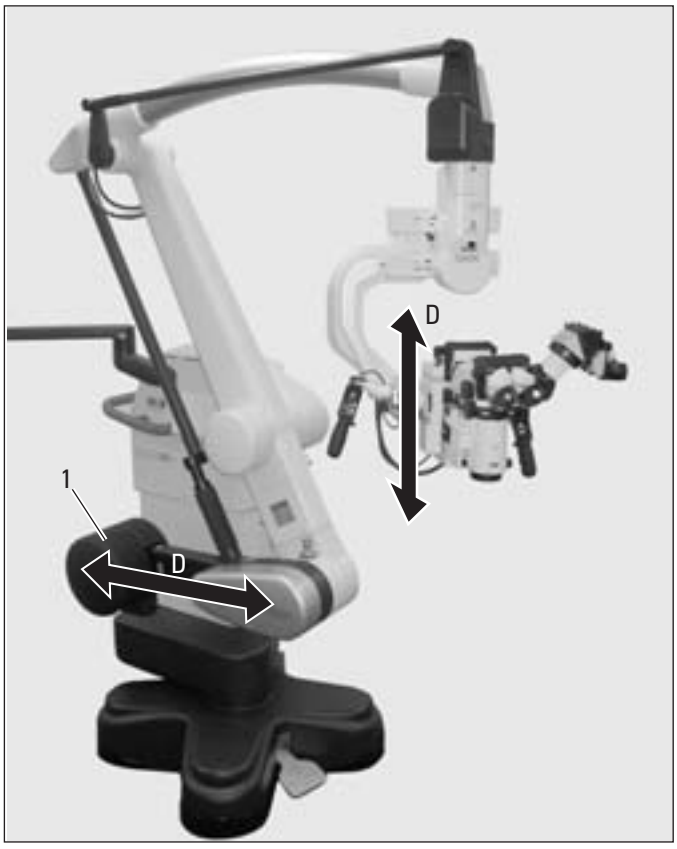
The optical carrier (in the B-position, e.g. for posterior fossa operations) tilts back:
⇨Move the B-axis forwards with switch (x) until the optical carrier is balanced.
The optical carrier tilts forwards:
⇨Move the B-axis back with switch (x) until the optical carrier is balanced.

If the microscope cannot be balanced manually, the weight of the accessories is probably outside the balanceable weight range. This can only be done for A, B and C axes by reducing or increasing the accessory weight to within the permitted range (see page 80).

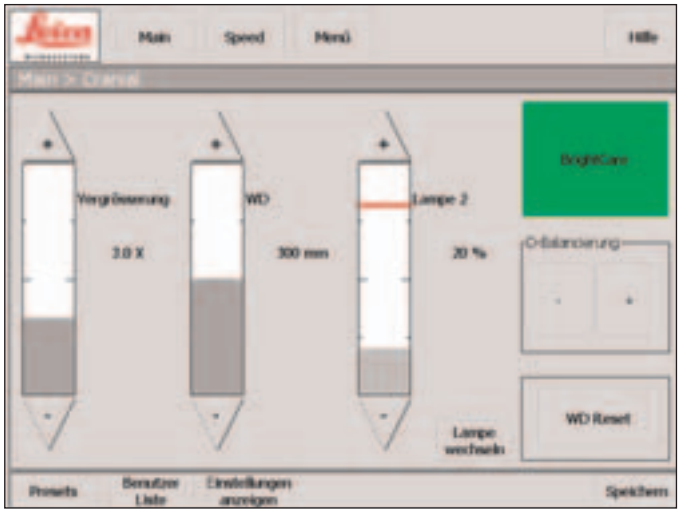
Correcting the D-balancing manually

The internal weight (3) in the stand balances the weight of the surgical microscope and the installed accessories.

☞ It may be necessary to correct the D-balancing after fitting a sterile drape on the microscope.



The D-balancing of the stand can be corrected with the "+" and "-" keys on the "Main" screen of the control unit.



"+" key: correction for higher load on the optical carrier
"-" key: correction for reduced load on the optical carrier

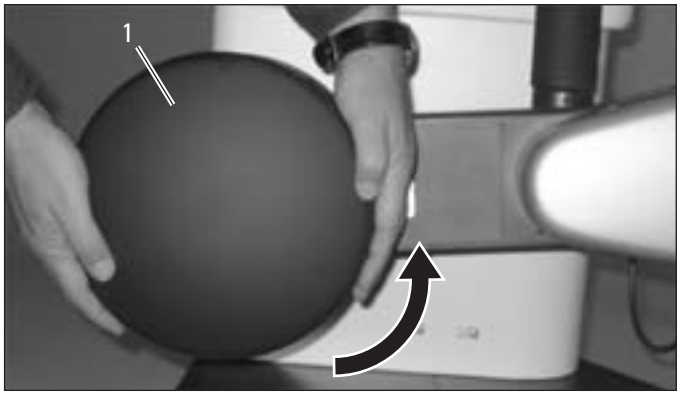
☞ To balance the D-axis when using accessories with different weights, the number of D-axis weight disks can be adapted accordingly (see below).

Changing the weight disk on the D-axis

If the Leica M525 OH4 cannot balance the accessories in use, a weight disk must be added to or removed from the D-axis.

Caution 1
Danger of injury due to falling weight disk or cover!
⇨When changing the weight disk, make sure that your feet are not beneath the weight disk or the cover.

⇨Locking the Leica M525 OH4 in position (see page 22).
⇨Detach the cover (1) from the axis.



⇨Unscrew the hexagon nut (3).

⇨Add or remove the disk (2).
⇨Screw on the hexagon nut (3).
⇨Re-attach the cover (1).

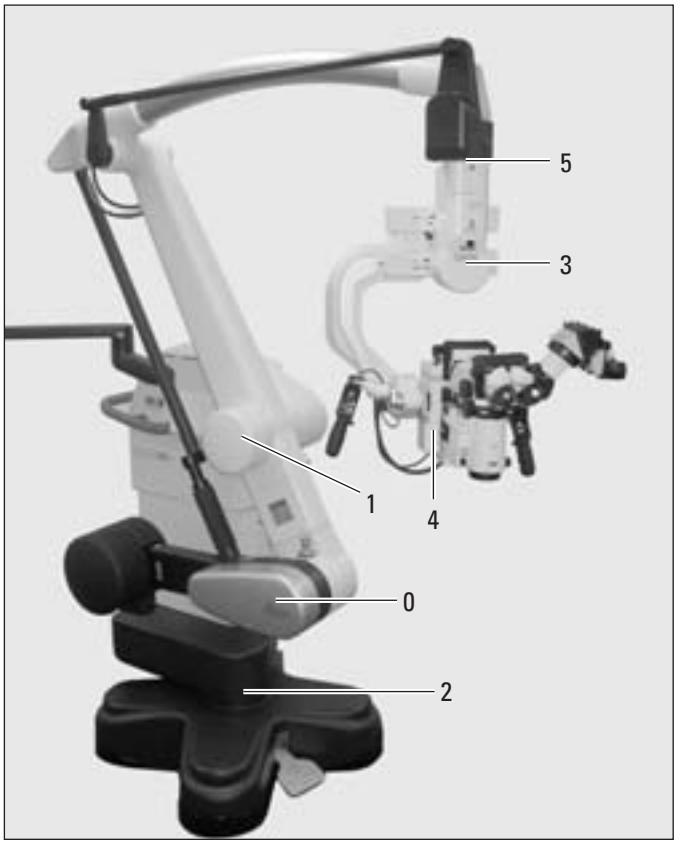
No. of weight disks		Load D-axis	
Heavy	Light	Min.	Max.
2	1	6.65	10.22
2*	2	7.4	10.88
2	3	7.9	11.54

*Standard configuration

Releasing the brakes

The Leica M525 OH4 surgical microscope has six electromagnetic brakes which stop the movements of the stand and surgical microscope:

- Up/down and forward/back in parallelogram (0 and 1)
- Base (2)
- In swing arm (3)
- On the A and B carriages of surgical microscope (4)
- In the rotary joint (5)



The CAN handle key with the "Selected Brakes" function (see also Assigning CAN handles, page 50) can release two different brake combinations: "Focus Lock" or "XYZ Free".

The brake combination "Focus Lock" is set as the default.

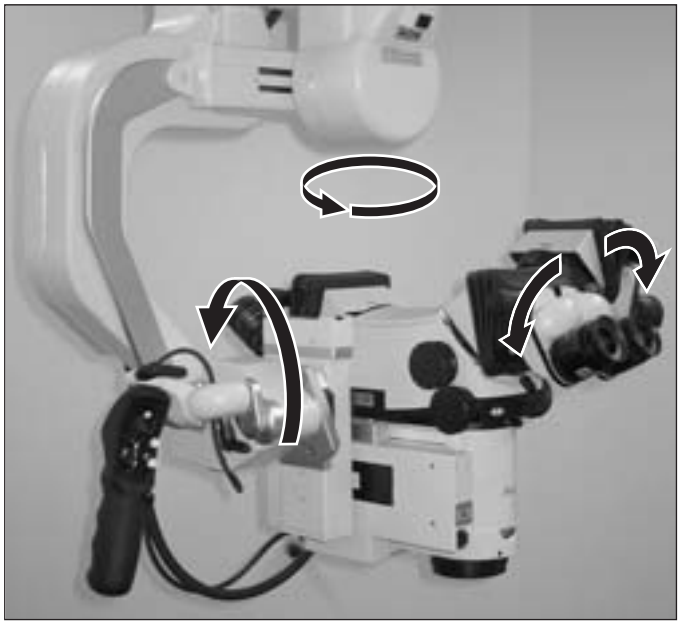
⇨Activate the desired brake combination "Focus Lock" or "XYZ Free" on the touch panel in the "Speed" menu by clicking the relevant button.

The button for the selected brake combination lights up green.

You can save the desired brake combination individually for each user in the user settings in the "Start Values Speed" menu.

The following movements can be performed with the surgical microscope when the brake combination "XYZ Free" is activated:

The following movements can be performed with the surgical microscope when the brake combination "Focus Lock" is activated:



Transport, transporting and rest positions

Warning 6
Danger of injury due to:
- **Uncontrolled lateral movement of the swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes could become trapped beneath the casing of the base.**

⇨For transportation, always move the Leica M525 OH4 surgical microscope into the transport position.
⇨Never move the stand in the extended condition.
⇨Never roll over cables lying on the floor.
⇨Always push the Leica M525 OH4 surgical microscope - never pull it.

Caution 2
Surgical microscope can move without warning!
⇨Always lock the footbrake when you are not moving the system.

Transport position

Always move your Leica M525 OH4 into the transport position before transporting it.

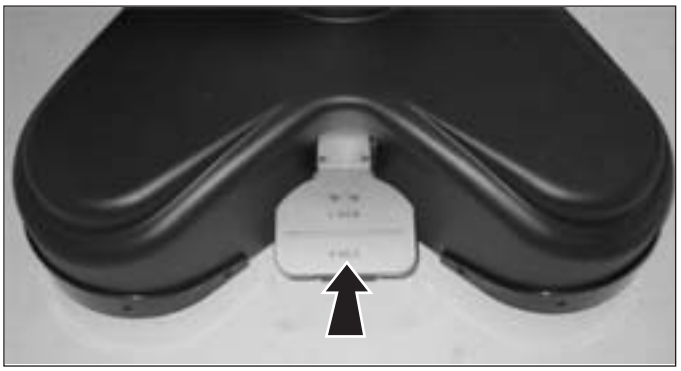
Caution 3
Damage to the Leica M525 OH4 surgical microscope due to uncontrolled tilting!
⇨Hold the CAN handle when releasing the brake.

Caution 4
Damage to the Leica M525 surgical microscope during transportation!
⇨Never move the stand in the extended condition.
⇨Never roll over cables lying on the floor.

⇨Press the "All Brakes" button and move the Leica M525 OH4 into the transport position (see illustration below).

Make sure that the video monitor does not collide with the horizontal arm and the vertical arm of the stand.

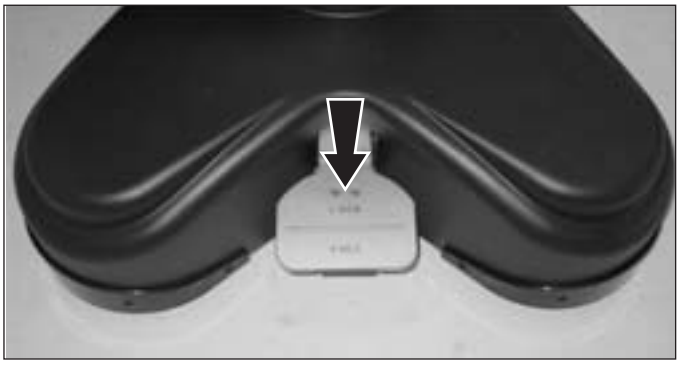
⇨Unplug and secure the power cable.
⇨Release the footbrake.
⇨Depress the footbrake at the front end (FREE).
The footbrake disengages and is released.



⇨Move the Leica M525 OH4 using the handle.

Rest position

Bring the microscope into rest position after use.
⇨Push the microscope in the transport position to its storage location.
⇨Depress the footbrake at the rear end (LOCK) until it engages.



⇨Pull the protective cover over the Leica M525 OH4.

Positioning on the operating table

Warning 3
Risk of injury through surgical microscope moving down!
⇨Never balance or re-equip the instrument over the field of operation.
⇨Always lock the Leica M525 OH4 in position before re-equipping it.
⇨Balance the Leica M525 OH4 after re-equipping it.
⇨Do not release the brakes when the instrument is in an unbalanced state.

The Leica M525 OH4 can be positioned easily on the operating table and offers a variety of possibilities for operations on the head or spinal column.

The M525 OH4 achieves this large range of positions through its very long and high swing arm.
⇨Release the footbrakes (see page 35).
⇨Move the Leica M525 OH4 surgical microscope carefully over to the operating table by the handle and into the required position for the operation.

Positioning options:

⇨Set footbrake.
⇨Plug the footswitch into the stand and position it.
⇨Plug the power cable into the stand.
⇨Connect the equipotential bonding to the stand.

Attaching sterile controls

Sterilizable covers can be fitted on the rotary buttons on the Leica M525 OH4 surgical microscope.

Covers for rotary buttons

Use the covers also when you use sterile disposable drapes.
The controls will be more grippy.

⇨Fit steam-sterilizable covers on the light field diameter adjustment knob and the working distance adjustment knob.

⇨Use steam-sterilizable covers also when using accessories.

Drape for footswitch

Packaging the footswitch in a plastic bag protects it against dirt.

Sterile drape for stand

You can also use an optional sterile disposable drape.

Caution 5
Risk of infection!
⇨Leave sufficient space around the stand to ensure that the sterile drape does not come into contact with non-sterile components.

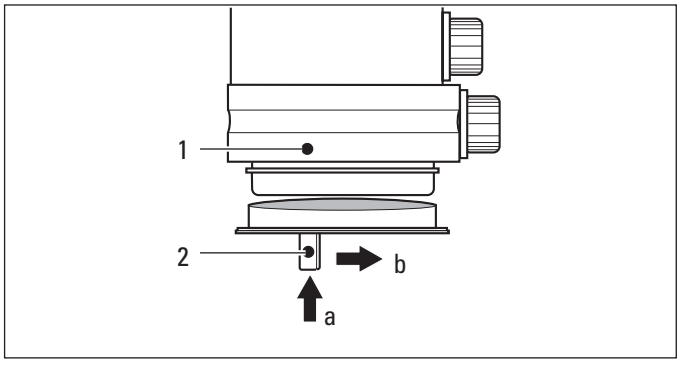
⇨Activate the "All Brakes" function on the CAN handle and extend the swing arm.
⇨Wear sterile gloves.
⇨Attach all sterile controls.
⇨Unpack the sterile drape carefully and drape it over the Leica M525 surgical microscope as far as the swing arm.
⇨Clamp the protective glass (optional) onto the objective.
⇨Do not attach the sterile drape too tightly with the provided ribbons. It must still be easy to move the instrument.

Check the ease of movement of the instrument.

Follow the instructions provided by the manufacturer of the sterile drape.

Attaching the protective glass to the objective

⇨Place the gas-sterilizable protective glass on the objective so that the marks on the optical carrier (1) and protective glass (2) are aligned one above the other.



⇨Insert the protective glass upwards into the bayonet mount in direction (a).
⇨Turn the protective glass in direction (b) until it engages.

Positioning the microscope

Coarse positioning

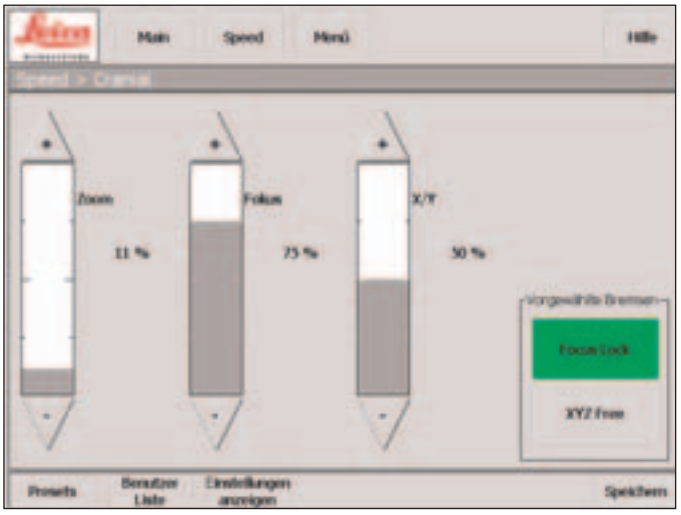
⇨Hold the microscope by both CAN handles.
⇨Press the button for releasing the brakes and position the microscope.
⇨Release the brakes button.

Also refer to the "Release brakes" chapter on page 34.

Caution 3
Damage to the Leica M525 OH4 surgical microscope due to uncontrolled tilting!
⇨Hold the CAN handle when releasing the brake.

Fine positioning

⇨Position the microscope with the XY drive using the joystick on the CAN handle or the joystick on the footswitch.



In the "Speed" menu you can adjust the speed at which the XY motors are operated.

This value can be saved individually for each user (see page 46).

Adjusting the microscope

Switching on the illumination

⇨Press push-button (1) for illumination.
The illumination comes on and the push-button is lit green.

☞ Leave the main and backup illumination on for at least 5 minutes, as otherwise luminosity will decrease rapidly.

Adjusting the brightness

Brightness can be increased or decreased using the touch panel monitor or a handswitch/footswitch or CAN handle.

On the touch panel monitor:
⇨Press the "+"- or "-" key on the brightness adjustment bar for illumination.
or
⇨Adjust the brightness directly in the bar.
The brightness of the active main illumination changes.

☞ Clicking the "+" or "-" key changes the brightness value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

☞ The start setting can be saved individually for each user.

☞ The main illumination can only be switched on and off using the illumination push-button (on/off) (1).

☞ The brightness setting is also visible when the illumination is off. However, the display bar will appear darker.

On the handswitch/footswitch /CAN handle:
Depending on assignment (see page 48), the brightness of the main illumination can also be increased or decreased using two correspondingly assigned keys on the handswitch/footswitch/ CAN handle.

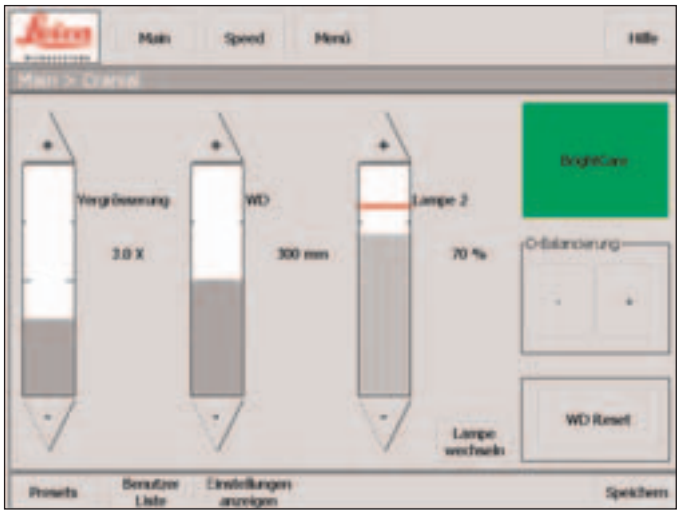
BrightCare™

BrightCare™ is a safety function which automatically limits the maximum brightness depending on the working distance. Excessively bright light can, in combination with a short working distance, cause burns in patients.

Explanation of luminous energy:
The optics of the Leica M525 OH4 surgical microscope have a variable working distance of between 207 and 470mm. The system is designed in such a way that it delivers sufficient light to produce a bright image even at a long working distance of 470mm.
According to the formula $E_v=I_v/d^2$, luminous energy increases constantly to 510% as a function of a reduction in working distance from 470 to 207mm. (E_v = light intensity, I_v= brightness, d= distance from light source).
This means that less light is required to work with the microscope at a shorter distance than at a greater distance.
It is advisable to begin with a low light output and increase the light intensity until an optimum level of illumination is achieved.

☞ With "BrightCare™" the safety function is activated for all users in the factory default configuration.

Explanation of heat release:
Heat from non-visible light (over 700nm) is filtered out of the light from the used xenon light source. Nevertheless, white light always releases heat. An excessive amount of white light can cause overheating of tissue and metallic objects.
Therefore, it is advisable to begin with a low light intensity and increase this until an optimum level of illumination is achieved.



The red line on the brightness adjustment bar shows the maximum adjustable brightness for the current working distance.
The brightness cannot be set to a level beyond the red line
When the working distance is reduced by too little at a set brightness, the brightness is reduced automatically.

This safety function can be deactivated by clicking the "Brightcare™" button. A dialog window opens in which you have to confirm that you want to deactivate the safety function.

BrightCare™
You are about to disconnect the BrightCare™ safety device.
This device limits brightness at working distances which are too short. Bright light at short working distances may cause thermal injury to patients.
See user manual for more information.

When the "Brightcare™" safety function is deactivated, the color of the "Brightcare™" button changes from green to yellow.

Warning 7
At a short focal distance, the light source of the illumination unit may possibly be too bright for the operating physician and the patient.
⇨Start with a low light level and gradually increase the light intensity until the operating physician has an optimally illuminated image.

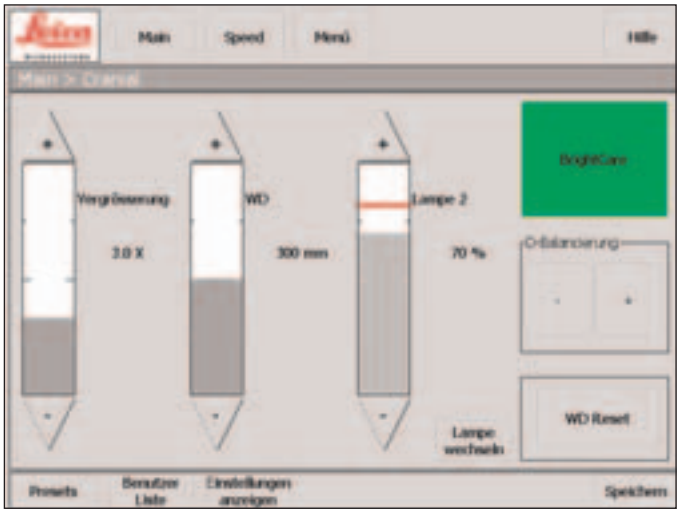
The status of the "BrightCare™" safety function can only be changed permanently in the "User settings" menu. A change in status during operational procedures will not be stored when the user settings are saved with "Save" or "Save as"!

Reactivating the "Brightcare™" safety function:
⇨Click the yellow "BrightCare™" button again.
"BrightCare™" is now activated and the button is again lit green.

Changing lamps

In case of failure of the xenon main illumination, your Leica M525 OH4 automatically uses the second xenon lamp as backup illumination.

☞ You can also switch manually to the backup illumination with the "Change Lamp" button on the "Main" screen.



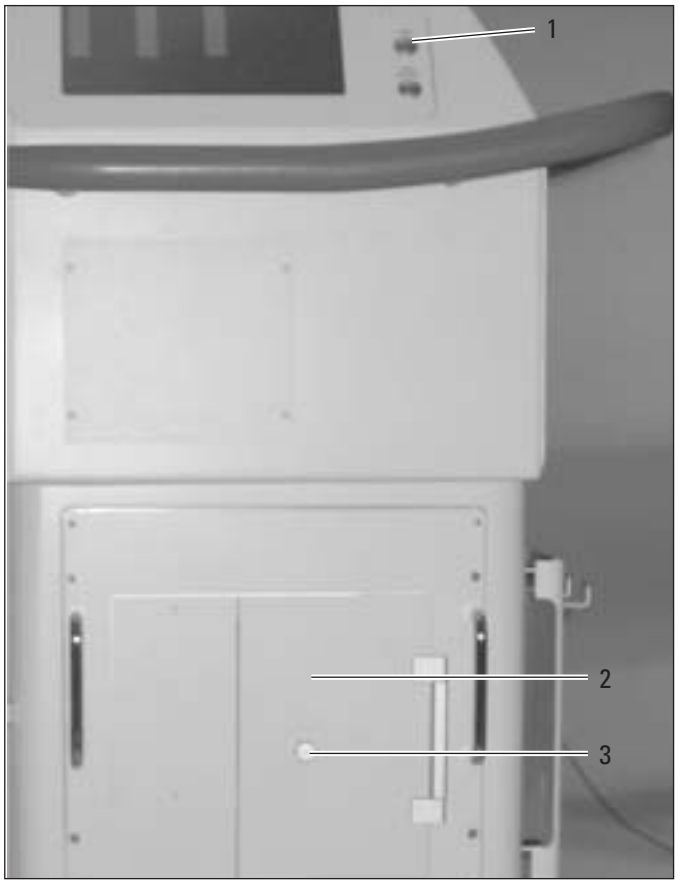
☞ Replace the defective lamp at the next opportunity.

☞ Never begin an operation with only one functioning xenon lamp.

☞ A dialog window informs you when the xenon lamp is losing luminosity. We recommend that you keep a replacement lamp handy.

Changing over to backup illumination

⇨Undo screw knob (3) and open the access door (2) for lamp inserts on the illumination unit.
The push-button (1) flashes orange.



⚠ **Caution 6**
Hot lamp insert can cause burns!
⇨Do not touch the hot lamp insert.

⇨Push down the lamp quick changer (4).

Setting the illumination field diameter

Caution 7
Heating of tissue!
If the illumination field diameter is larger than the visual field and the light intensity is set too high, uncontrolled heating of tissue can occur outside the visible range of the microscope.
⇨Do not set the light intensity too high.

The light field diameter is automatically adapted to the size of the visual field at the Leica M525 optical carrier. The illumination field diameter can also be adjusted manually with rotary button (2). Automatic adjustment can be deactivated with the rotary button and reactivated with the Reset button (1).

If the illumination field diameter is blocked at a high light intensity in a high zoom setting, and cannot be adjusted automatically or manually, then the light intensity must be reduced in order to protect the tissue.

If the illumination field diameter remains blocked in a low zoom setting, and cannot be adjusted automatically or manually, then an OP lamp can be used for better illumination of a large visual field (low zoom setting).

Adjusting the magnification (zoom)

You can set the magnification with a footswitch/handswitch or with the "Magnification" adjustment bar in the "Main" menu of the control unit.

Clicking the "+" or "-" key changes the magnification value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

You can adjust the zoom motor speed in the "Speed" menu.

These values can be saved individually for each user (see page 46).

Warning 8
Danger to the patient due to failure of the zoom motor!
⇨In case of failure of the zoom motor, the zoom can be adjusted manually.

Manually adjusting the magnification (zoom)

Caution 8
Destruction of the zoom motor!
⇨Use the manual adjustment of the zoom motor only if the zoom motor is defective.

In case of failure of the zoom motor, the zoom can be adjusted manually using rotary button (3).

⇨Hold down rotary button (3).
⇨Set the desired magnification by turning the knob.

Setting the working distance (focus)

Warning 9
Danger of serious damage to tissue due to incorrect working distance!
⇨When using lasers, always set the working distance of the microscope to laser distance and lock the microscope in position.

You can set the working distance with the footswitch/hand-switch or with the "WD" adjustment bar in the "Main" menu of the control unit.

Clicking the "+" or "-" key changes the working distance in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

You can adjust the focus motor speed in the "Speed" menu.

Using the Reset WD button, the focus motor can be set to the working distance which has been saved for the current user (see page 46).

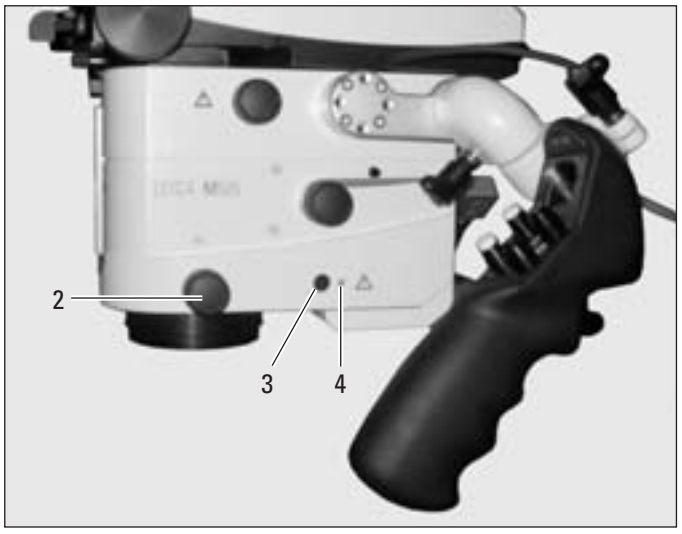
You can save the currently set working distance on the "Main" screen of the control unit or read it off the display (1) on the M525 optical carrier.

Warning 10
Danger to patient due to failure of the zoom motor!
⇨In case of failure of the zoom motor, the zoom can be adjusted manually.

Setting the focus manually

Warning 11
Danger of serious damage to tissue due to incorrect manual adjustment of the working distance!
⇨Do not adjust the rotary button for manual setting of the working distance while using the laser.

In case of failure of the focus motor, the focus can be adjusted manually using rotary button (2).



⇨Turn rotary button (2) and set the focus as required.

Locking/releasing the focus

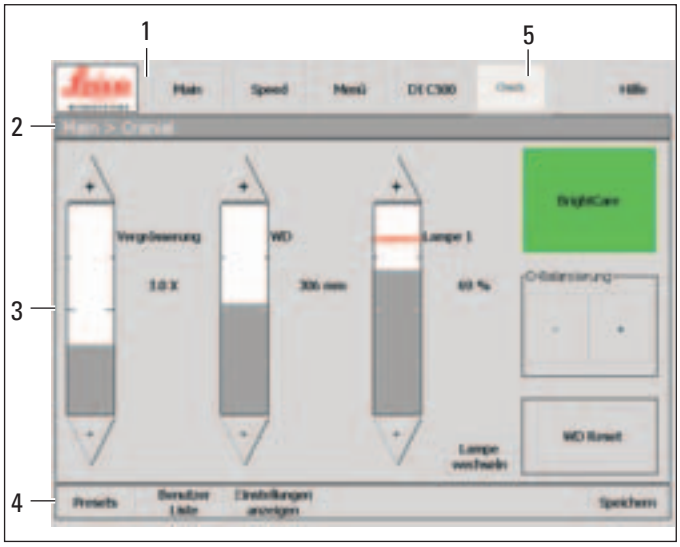
It is necessary to lock the focus when working at a fixed distance or when using the laser.

⇨Press key (3).
The yellow LED (4) comes on and the focus is locked.

⇨Press key (3) again.
The yellow LED (4) goes out and the focus is released.

Control unit with touch panel

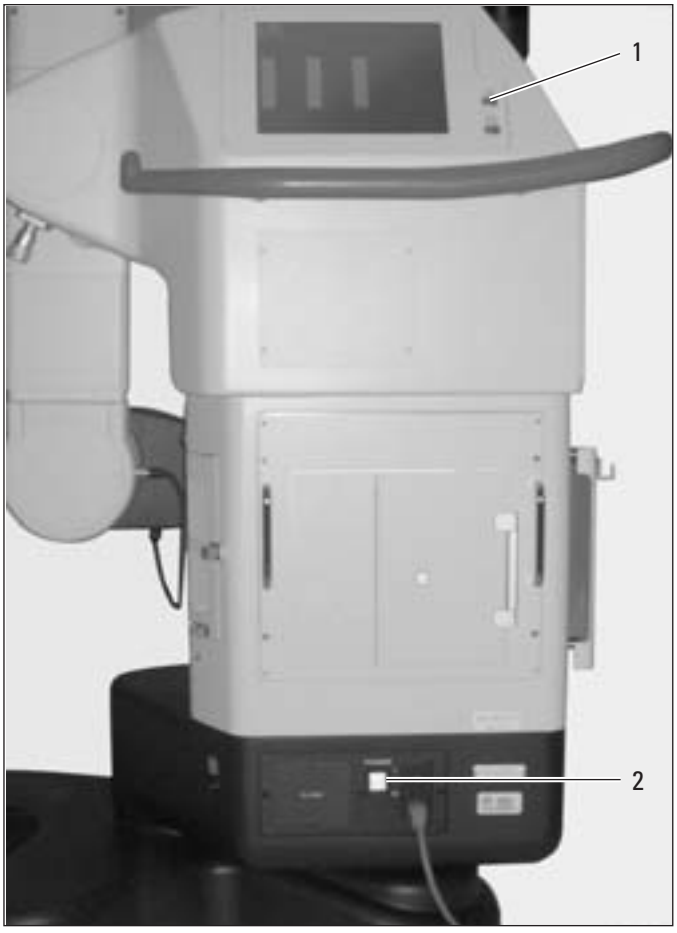
Menu structure



1 Quick access to the screens "Main", "Speed", "Menu", "DI C500" and "Help"
2 Warning messages
3 Status line
4 Display range
5 Dynamic button bar

Switching the microscope on

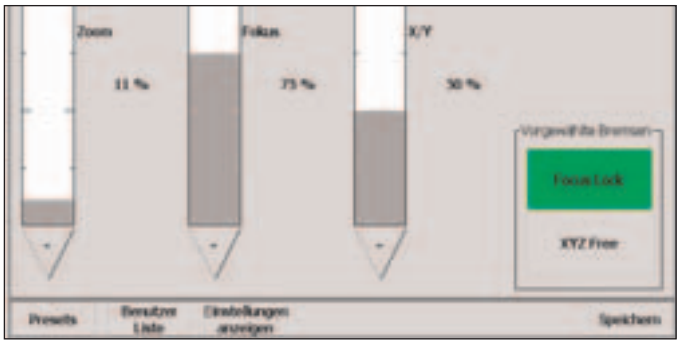
⇨Switch on the microscope at the power switch (2) on the stand.
After the surgical microscope is switched on, the settings of the last active user are loaded.
⇨Switch on the illumination with the key (1) on the control unit.



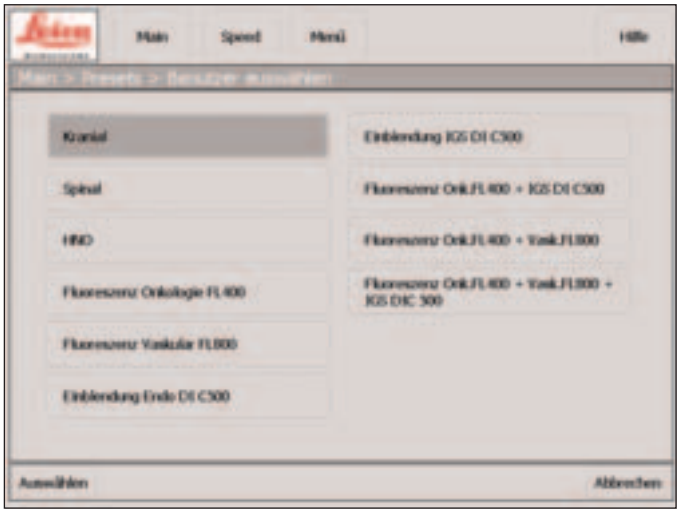
In operational mode, the status bar displays the current user and specifies the current location in the menu at all times.

Selecting users

In the "Main" and "Speed" menus, three buttons are always displayed in the dynamic button line: "Presets", "User List" and "Show Settings".



You can find a list of default users preset by Leica for the most common types of operation under "Presets".



⇨Select one of the preset default users and click "Load".
The Leica M525 OH4 surgical microscope is ready to operate straight away.

You can adapt and save the settings of these default users as required (see page 44).

You can click the "Show Settings" button at any time to see an overview of the user settings of the current user.

Clicking the "User List" button opens a two-screen list of users from which you can select one of up to 30 configurable users.

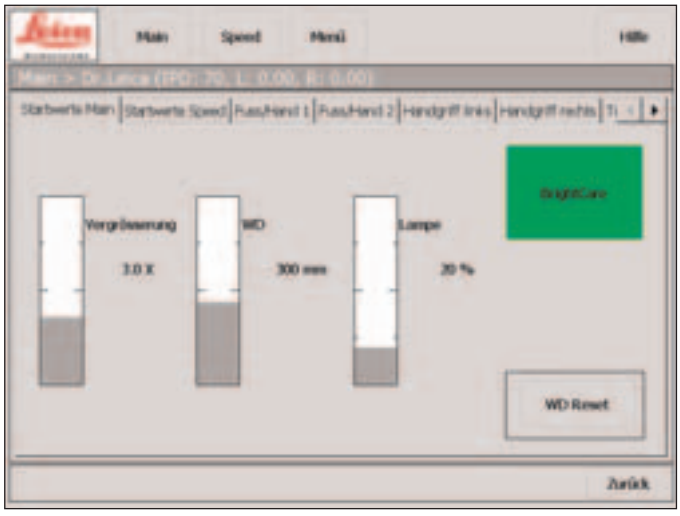
Click the "1-15" or "16-30" button to switch between screens.

⇨Select user and click "Select".
The user settings are loaded.

When the user list is open, it can be edited at any time (see page 45).

Before every operation, make sure the required user is selected and familiarize yourself with the assignments of the CAN handle and, if used, the optional footswitch.

⇨Click “Show Settings” button to see an overview of the user settings of the curent user.



Editing the user list

Various functions are available in the user list depending on the situation.

⇨Select user.
The available functions are displayed in the dynamic button line:

- "Move"
  Moves the selected user to another available location of your choosing.
- "Delete"
  Deletes the selected user.

Finally, you must confirm this action with "Acknowledge".

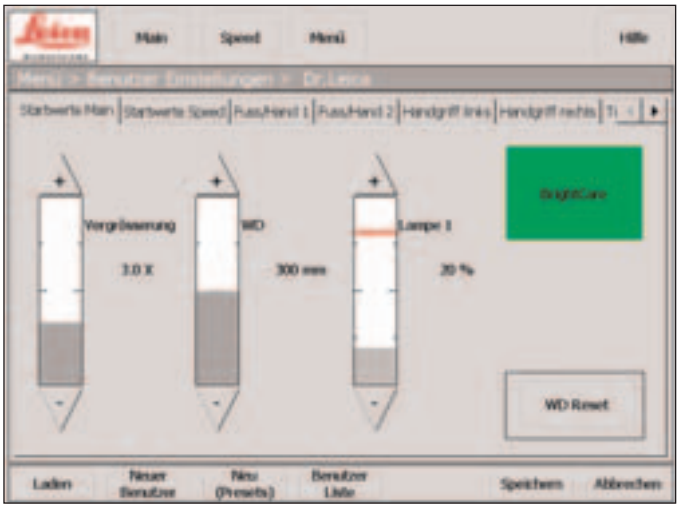
- "Rename"
  Renames an existing user. The user's settings are not changed.

☞ In the "User Settings" menu, click the "Edit User List" button to access the dynamic button line in user list edit mode.

☞ We recommend that you do not change the configuration of the user settings or edit the user list during an operation.

Configuring users (User Settings menu)

You can configure user settings in this menu.



- "Load"
  Loads the settings of an existing user from the user list for modifying.
- "New User"
  Opens a new user with "blank" settings.
- "New (Preset)"
  Opens the "Preset" screen for selecting a default user in order to create a new user with the settings of the desired preset and to load or modify the user's settings.

☞ You can also add a user from the operational menu. If you want to keep the current settings, you can save them by clicking the "Save" button (which appears as soon as the basic settings of the current users have been changed), either for the current user ("Save") or under a new username ("Save as").

Saving user settings

⇨Click the "Save" button.
⇨In the user list select an available location where the user can be saved.

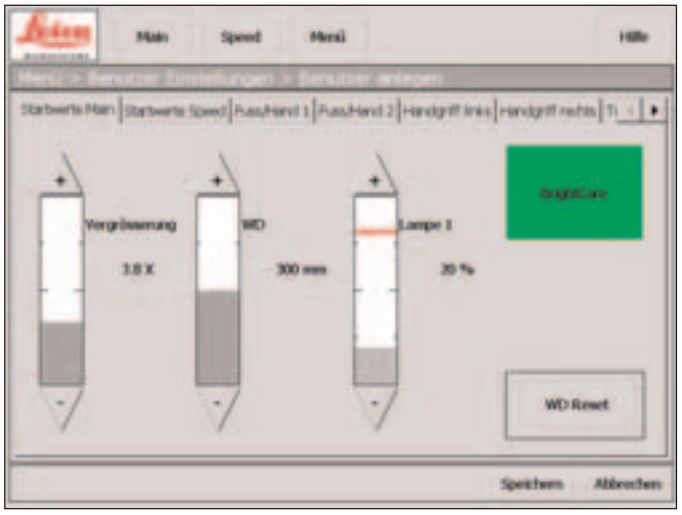
☞ If you like, you can edit the user list first.

⇨Enter the desired username using the keyboard.

⇨Click the "Save" button to save the user at the desired location under the name you have entered.

Setting the "Main" start values

On this screen, you can set the start values for illumination, working distance and magnification.



☞ Clicking the "+" or "-" key changes the values in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

☞ You can also set the desired value by directly clicking the bars.

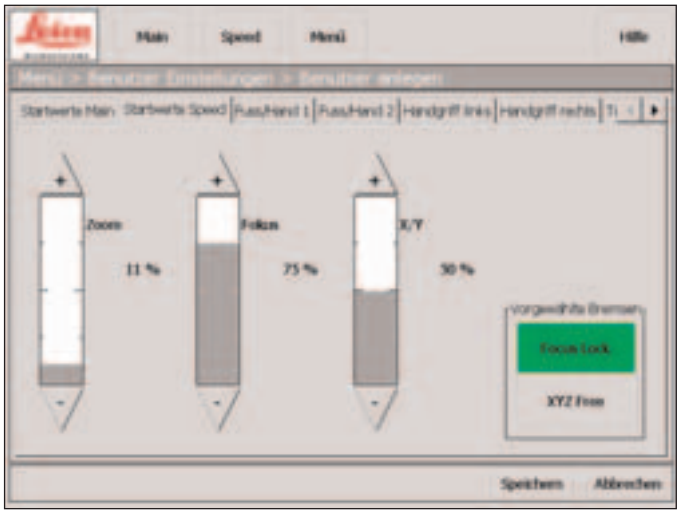
☞ On the "Main" user settings screen you can set the status of the BrightCare™ safety function for the selected user.

☞ On the "Main" user settings screen you can permanently save the default settings for WD-Reset. If "WD Reset" is activated, the focus motor automatically moves to the working distance saved for each user in the user settings when "All Brakes" are released. This function is deactivated in the factory default configuration.

⇨Click the "WD-Reset" button.
The "WD-Reset" function is activated, the "WD-Reset" button changes color form gray to green.

Setting the drive start values

You can set the start values for the travel speed of the zoom, focus and XY motors on this screen.

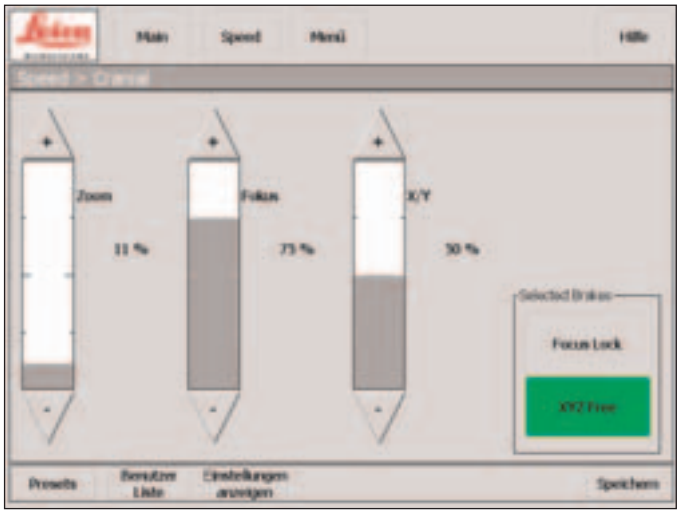


Clicking the "+" or "-" key changes the values in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

You can also set the desired value by directly clicking the bars.

On the "Speed" menu screen you can also select the desired brake combination "Focus Lock" or "XYZ Free" for the CAN handle function "Selected Brakes".

⇨Activate the desired brake combination "Focus Lock" or "XYZ Free" on the touch panel in the "Speed" menu by clicking the relevant button.
The button for the preselected brake combination lights up green.



Footswitch/handswitch assignment

Here, you can configure individual settings for each user for the footswitch/handswitch you are optionally using.

⇨Select the footswitch/handswitch you are using in the right options menu.

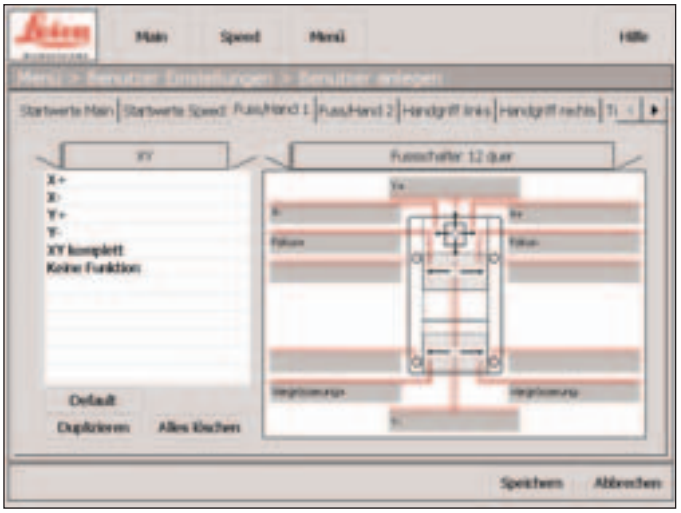
You can scroll forwards or backwards in the list by clicking the arrowheads.

You can also connect the 6-function footswitch to the Leica M525 OH4 as an option. The existing 6 switches have the same functions as the currently selected 12 or 16-function footswitch.

⇨Click the "Default" button.
The default settings are assigned to the selected footswitch/handswitch.

You can then modify these settings as you like.

Clicking the "Clear All" button clears the assignments for all keys.



Configuring individual keys

⇨Select the footswitch/handswitch you are using in the right options menu.

☞ You can scroll forwards or backwards in the list by clicking the arrowheads.

⇨Select the function group with the desired functions in the left options menu.

☞ You can scroll forwards or backwards in the list by clicking the arrowheads.

⇨Select the desired function.
⇨Click the caption of the desired key to assign the selected function to it.
or
⇨Press the corresponding key on the connected footswitch.

Overview of function groups

Drive:
Magnification +
Magnification -
Focus +
Focus -
No function

Extra:
AD.F.1 Toggle
AD.F.1 Pulse
AD.F.2 Toggle
AD.F.2 Pulse
MDRS 3 Record Start/Stop
XGA Out toggle 1/2
XGA Out toggle 1/2/3
Video toggle source
AF500 Start
No function

☞ You can change the status of a function with the "Toggle" function (e.g. on/off). The "Pulse" function continuously changes a status (such as increasing the brightness).

Light:
Illumination +
Illumination -
No function

XY:
X+
X-
Y+
Y-
XY Complete
No function

☞ With the "XY Complete" function, you can assign all four functions of the joystick simultaneously.

Fluorescence:
FL400 Mode On/Off
FL800 Mode On/Off
FL800 NIR Zoom Reset
MDRS3 FL:Record Start/Stop
MDRS3 FL:Playback&Enter
MDRS3 FL:Menu&Down
No function

DI C500 / IGS:
DI C500: Image Injection On/Off
DI C500: Shutter Control
DI C500: Brightness+
DI C500: Brightness-
IGS 1
IGS 2
IGS 3
IGS 4
No function

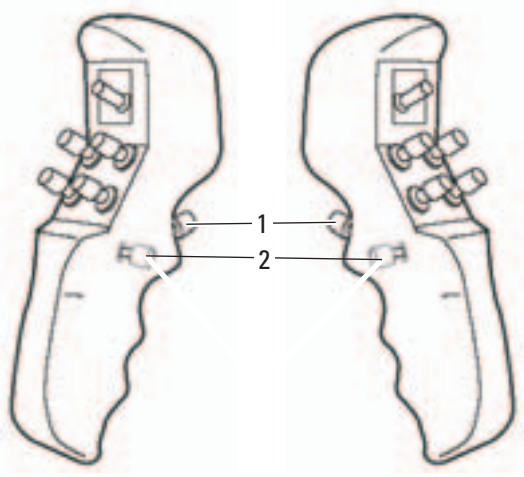
☞ To delete an assignment which you do not want, select the "No function" element - which can be found in all function groups - and assign it to the key in question.

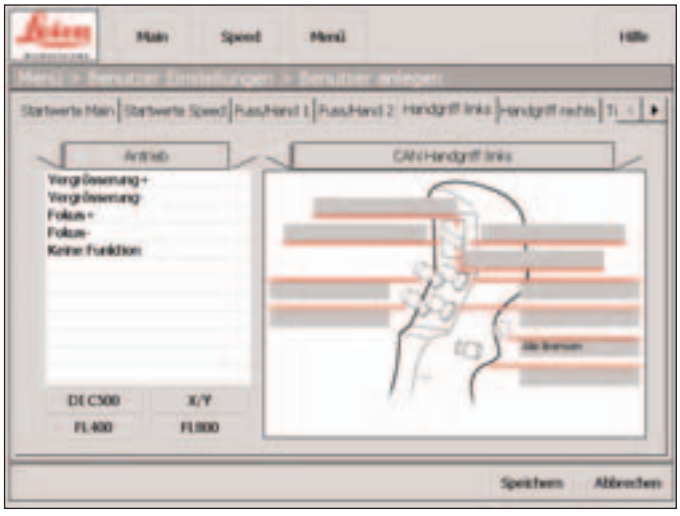
☞ If you are creating only one footswitch/handswitch configuration for one user, we recommend duplicating it to the second footswitch/handswitch input by pressing the "Duplicate" button.
This ensures that your footswitch/handswitch functions the way you want it to, regardless of which input it is plugged into.

CAN handle assignments

On the two CAN handle assignment screens, you can assign up to nine functions of your choice to the left and right CAN handles.

The "All Brakes" function is always assigned to the rear switch (1) for both CAN handles, and can neither be overwritten nor deleted.





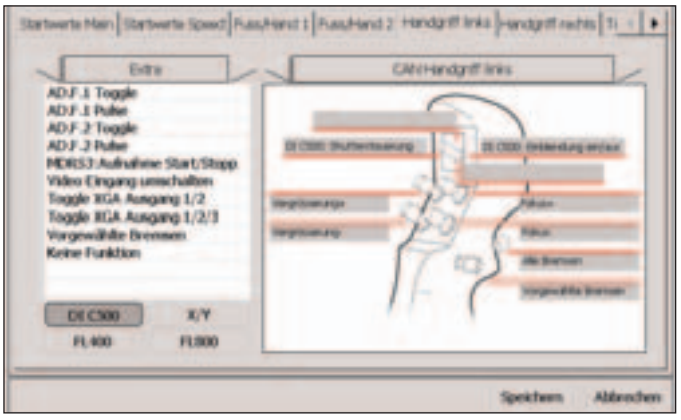
⇨Select the function group with the desired functions in the left options menu.

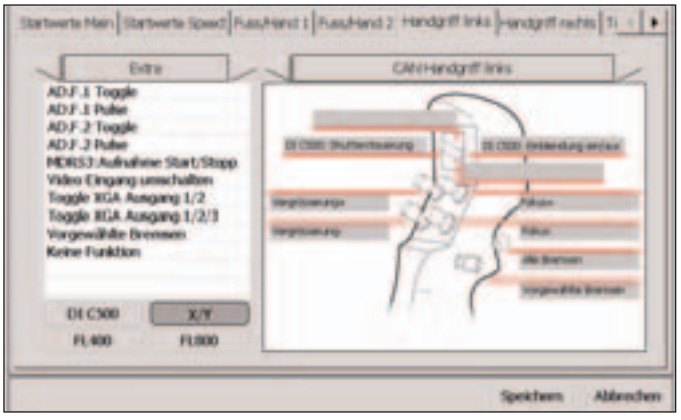
You can scroll forwards or backwards in the list by clicking the arrowheads.

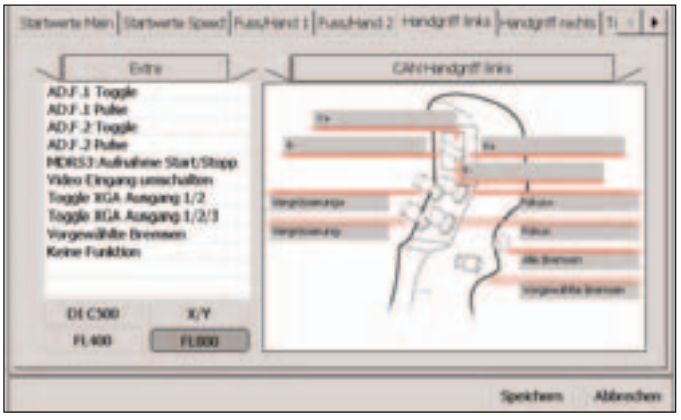
⇨Select the desired function.
⇨Click an available caption of the desired key to assign the selected function to it.

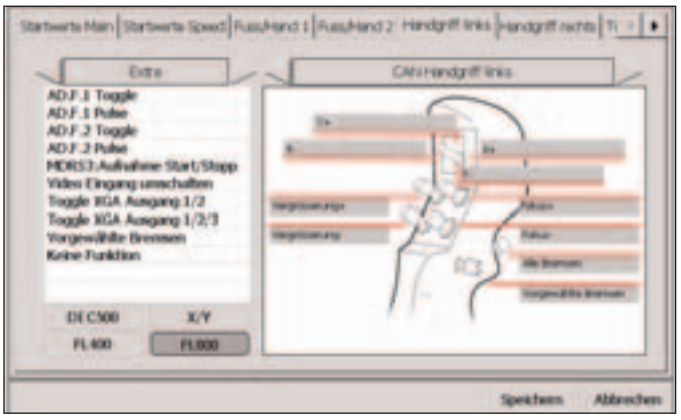
The inner switch (2) to which "Selected Brakes" is pre-assigned can be freely assigned, as required.

You can also assign one of the four defaults "DI C500", "X/Y", "FL400", "FL800" completely to each CAN handle.



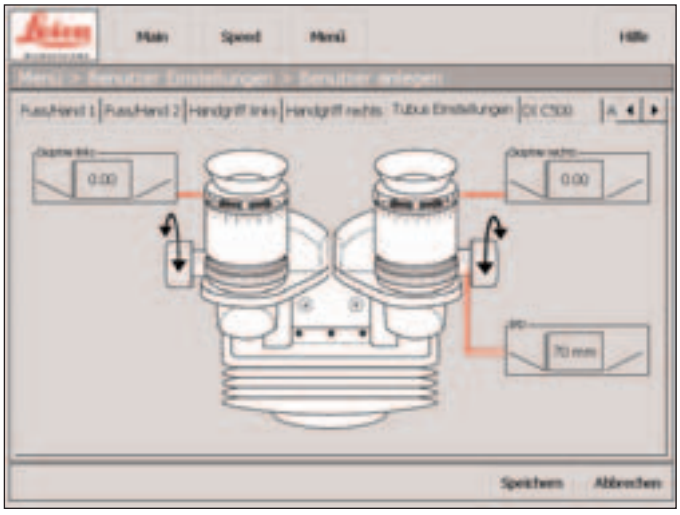






Tube Settings

On this screen, you can store the diopter values and interpupillary distance for each user.

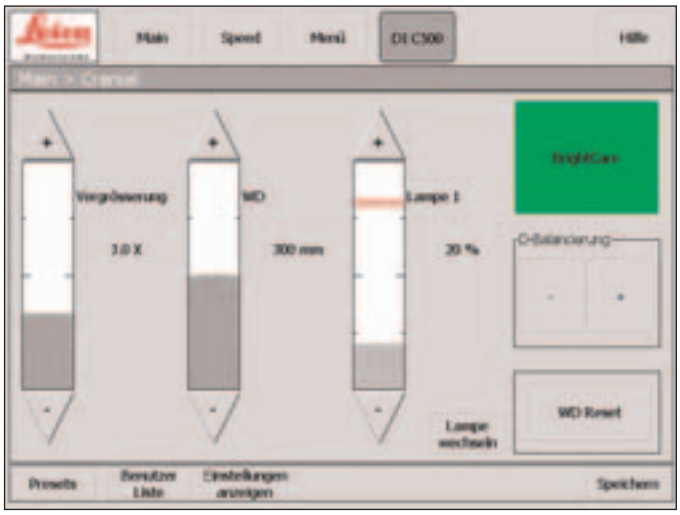


You can set the user-specific values by clicking the arrowheads. These values are shown for the current user in the status line.

Leica DI C500

Operating the control unit

If you are using a DI C500, a Quick Access Button "DI C500" is added to the static menu line.

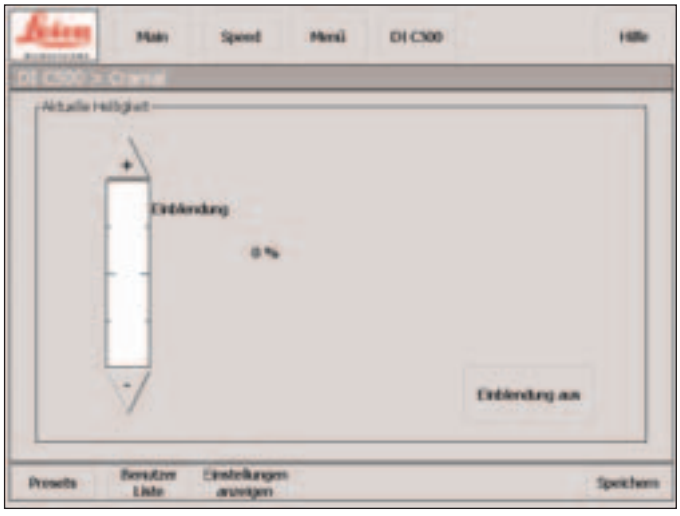


Changing the current brightness of the image data:
⇨Press the "+" or "-" key on the "DI C500" screen.
or
⇨Adjust directly by clicking the brightness adjustment bar.

Clicking the "+" or "-" key changes the brightness value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

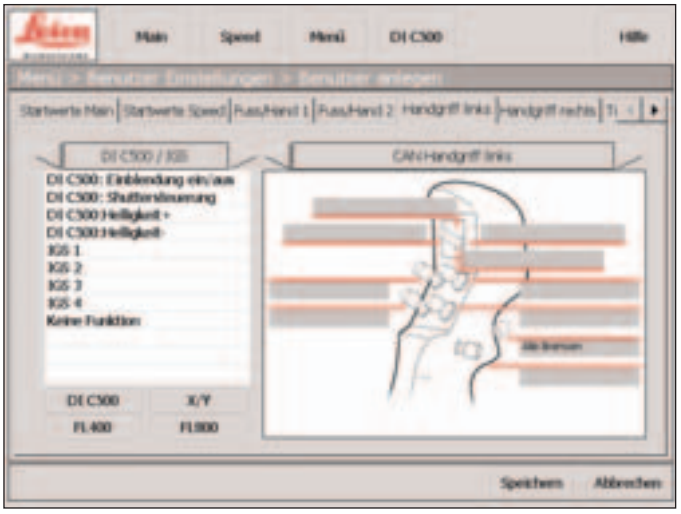
Press button “Image off” to switch of the DI C500 display (brightness = 0 %).

You can also adjust the brightness of the image data using the CAN handle/footswitch.



Controls on the CAN handle/footswitch

You can assign the following functions to your CAN handle/ footswitch for controlling your Leica DI C500 (see page 12):



"DI C500: Image Injection on/off"
Switches the data display on/off manually. The shutters are switched as pre-configured in the user settings.

You require this function for example when you want to display endoscope data on your Leica DI C500.

"DI C500: Shutter Control"
Opens or closes the shutter manually as pre-configured in the user settings.

"DI C500: Brightness+"
Increases the brightness of the image data.

"DI C500: Brightness-"
Reduces the brightness of the image data.

User settings

You can configure the following settings for the user in the user settings:
- Default brightness for the injection of overlay data and non overlay data
- Shutter settings for manual operation
- Shutter settings
- Surgeon's shutter settings

Setting the default brightness for the injection of overlay data and non overlay data:
⇨To adjust the brightness, press the "+" or "-" key or click directly in the bar.

Clicking the "+" or "-" key changes the brightness value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

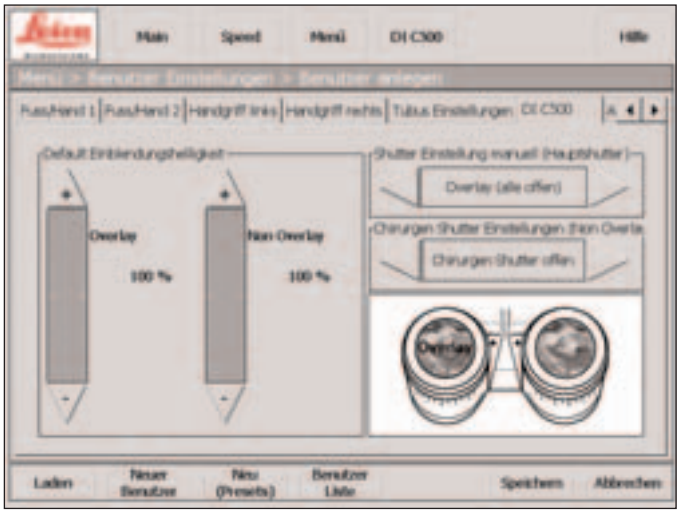
Shutter settings for manual operation:

You can adapt these settings intraoperatively using the CAN handle or on the "DI C500" screen on the control unit (see page 48).

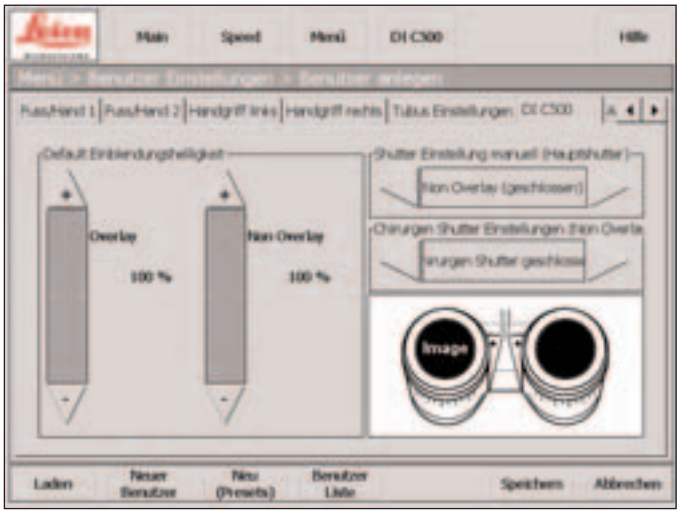
Shutter settings:

⇨Specify how data are to be displayed on your Leica DI C500 in the options menu "Manual Shutter Settings (Main Shutter)".

Overlay Data (open)
Displayed data are overlaid on the object.
All shutters are opened.



Non-Overlay (closed)
Displayed data are displayed on a black background. The shutter on the display side is closed.



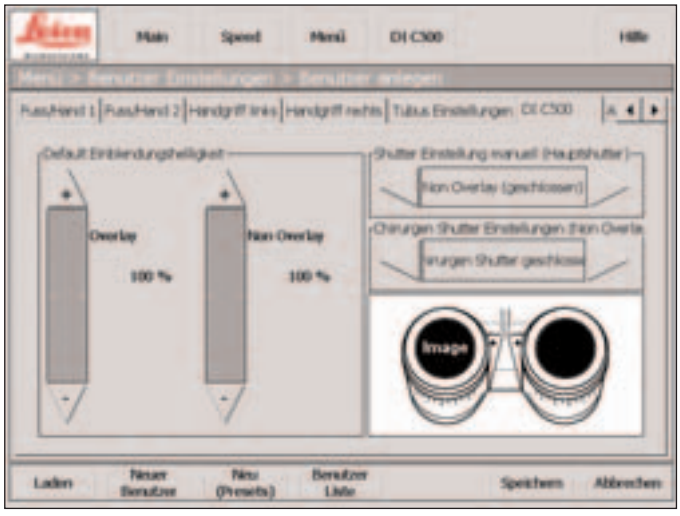
A connected IGS navigation system automatically controls the shutter independent of this setting.

Surgeon's shutter settings

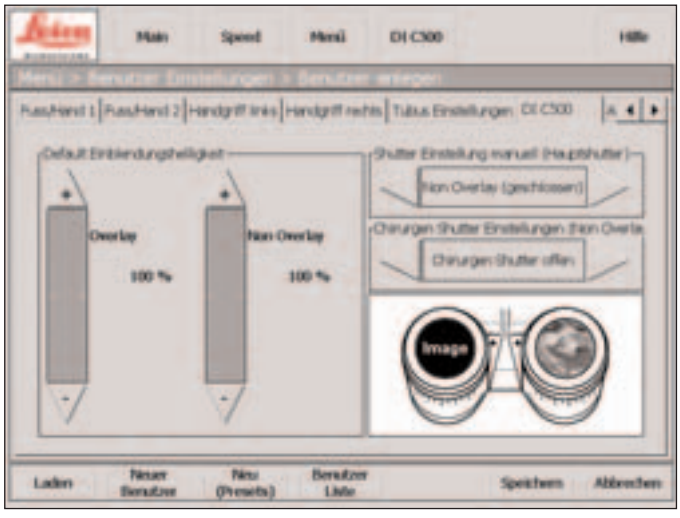
⇨In the options menu "Surgeon Shutter Settings (Non Overlay Data)" specify whether you want with or without object view in the non reflected beam path on the surgeon's side.

Surgeon's shutter closed
The second beam path is dimmed. In the other beam path, the data is displayed on a dark background.

This setting does not affect the assistant's view.



Surgeon's shutter open
You have a view of the object in the second beam path. In the other beam path, the data is displayed on a dark background.



In the preview window you can view the shutter settings you have selected, depending on the display side that is currently set on your Leica DI C500.

Leica AF500

The autofocus Leica AF500 works with the cameras Leica2, Sony DXC 33P and Leica UV-camera Hitachi. Contact your Leica representative if you want to adapt another camera.

We recommend to use the Leica AF500 only in combination with a video adapter having a fix focal length.

Operating

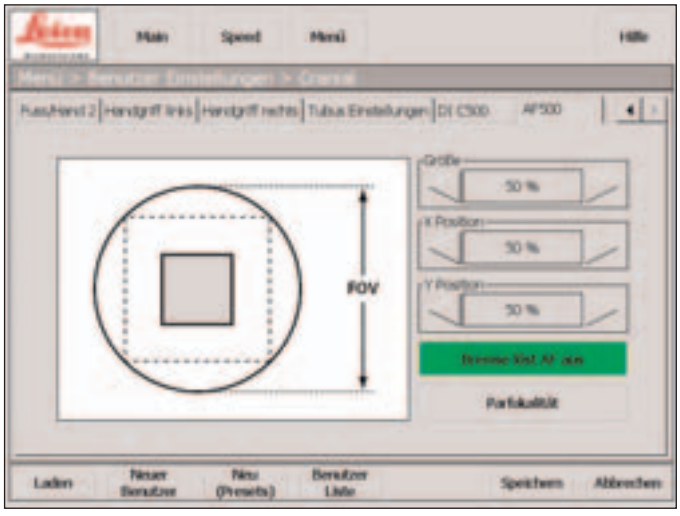
⇨To switch on the autofocus press on/off button on the front side of the housing.
⇨Start autofocus function by pressing the corresponding button on the CAN handle.
(see "Footswitch/handswitch assignment "on page 48)

If you activate the „Brake starts Autofocus" function in the user settings menu the autofocus is automatically focussing when releasing „All brakes" or „Selected Brakes" .

If you activate the parfocality function in the user settings menu the autofocus is always driving in maximum position first, then in minimum position and back to current set working distance when focussing.

User settings in the control unit

The autofocus can be individually assigned for each user in the "User Settings" menu.



Resize autofocus window
The preview shows actual size of the autofocus window. Autofocus window displays the area of the object that is to be focussed on.

You can proportionately increase or decrease the size of the autofocus window for your needs. The default setting is 25%.

Clicking the "+" or "-" key changes the value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

Because autofocus needs a flat image plane to be set in focus you should reduce the size of the autofocus window. The default Setting is 25%.

Adjusting the position of autofocus window

The preview shows actual position of the autofocus window. Autofocus window displays the area of the object that is to be focussed on.

You can move the position of the autofocus window. Adjust value for X- and Y-position.

Clicking the "+" or "-" key changes the value in increments of one. Holding down the mouse button with your finger changes the value in increments of five.

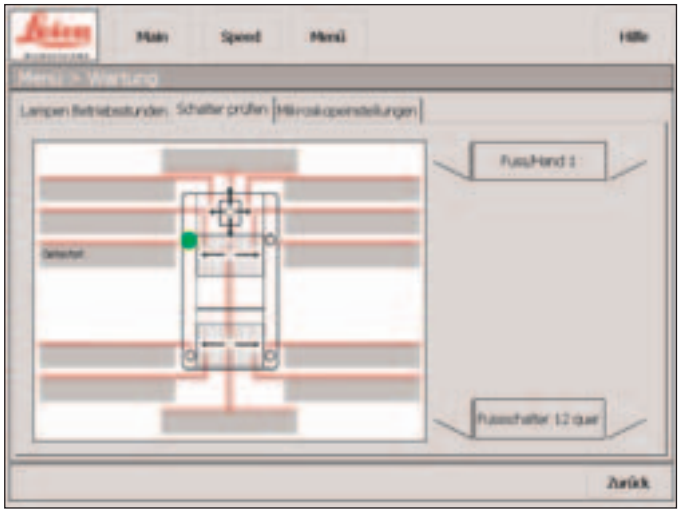
The default setting is 50 % along each axis. This places the autofocus window exactly in the centre.

The Maintenance menu

Hour meter for the bulbs (Lamp History)
On this screen, you can view the operating hours of xenon lamp 1 and xenon lamp 2.

☞ Whenever you replace a bulb, reset the bulb's hour meter to 0 by double-clicking the "Reset" button.

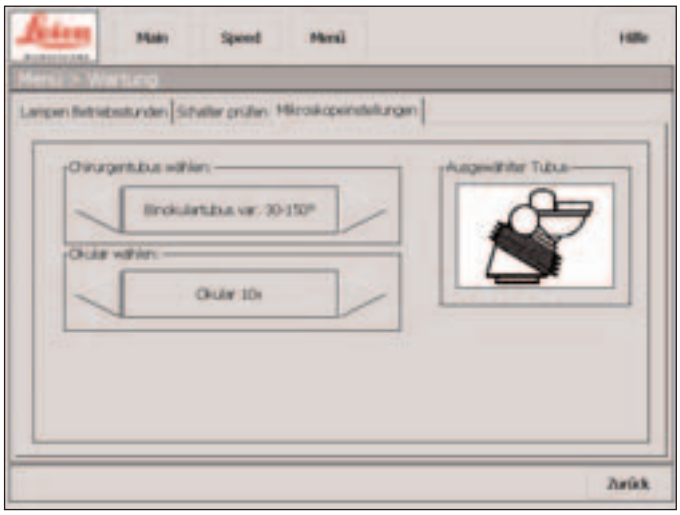
Check switches
On this screen, you can test the footswitches/handswitches and CAN handles you are using.



⇨Select the connection you are using in the right upper options menu.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨Select the footswitch/handswitch or CAN handle to be tested in the right lower options menu.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨Press all of the keys, one after the other, of the footswitch/handswitch or CAN handle you want to test.
If the key you have pressed is functioning properly, a green dot appears on it on the display. The comment "Tested" appears in the caption field of the key.

Microscope settings

On this screen you can configure the accessories you are using.
This ensures that the correct magnification is displayed on the "Main" menu screen.



⇨In the top options field, enter the tube currently being used by the surgeon.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.
⇨In the middle options field, select the magnification of the eyepieces being used by the surgeon.
⇨You can scroll forwards or backwards in the list by clicking the arrowheads.

☞ If you do not make a selection, the magnification is calculated for the standard equipment - binocular tube 30°-150° and eyepiece with 10x magnification.

The "How to…" menu

This screen displays, in short form, user instructions for operating your surgical microscope.

☞ The "Help" button in the static menu bar provides access to the "How To..." screens at all times.

The Service menu

This area is password-protected.

The Leica M525 OH4 surgical microscope is state-of-the-art technology. Nevertheless, hazards can arise during operation.
⇨Always follow the instructions in this user manual, and in particular the safety guidelines.

Intended use

- The Leica M525 OH4 surgical microscope is an optical instrument for improving the visibility of objects through magnification and illumination. It can be applied for observation and documentation and for human and veterinary medical treatment.
- The Leica M525 OH4 surgical microscope may be used only in closed rooms and must be placed on a solid floor.
- The Leica M525 OH4 surgical microscope is subject to special precautionary measures for electromagnetic compatibility. They must be installed and put into operation in accordance with the guidelines, manufacturer's declarations and recommended safety distances (Tables 201, 202, 204, and 206 according to EN 60601-1-2:2001).
- Portable and mobile as well as stationary RF communications equipment can have a negative effect on the reliability of the Leica M525 OH4 surgical microscope.

⚠ **Warning 12**
Not suitable for use in ophthalmology!

Directions for the person responsible for the instrument

⇨Ensure that the Leica M525 OH4 surgical microscope is used only by persons qualified to do so.
⇨Ensure that this user manual is always available at the place where the Leica M525 OH4 surgical microscope is in use.
⇨Carry out regular inspections to make certain that the authorized users are adhering to safety requirements.
⇨When instructing new users, do so thoroughly and explain the meanings of the warning signs and messages.
⇨Assign individual responsibilities for starting, operating and servicing the Leica surgical microscope and monitor the observance of these responsibilities.
⇨Only use the Leica M525 OH4 surgical microscope if it is free of defects.
⇨Inform your Leica representative or Leica Microsystems (Schweiz) AG, BU SOM, 9435 Heerbrugg, Switzerland, immediately if you detect a product defect that could potentially cause injury or harm.
⇨If you use accessories made by third-party manufacturers with the Leica M525 OH4 surgical microscope, be sure that each such manufacturer confirms the safety-engineering, harmless usability of the product and observe the product's user manual.
⇨Modifications to or service on the Leica M525 OH4 surgical microscope may be carried out only by technicians who are explicitly authorized by Leica to do so.
⇨Only original Leica replacement parts may be used in servicing the product.
⇨After servicing or making technical modifications, the instrument must be re-set in accordance with our technical specifications.
⇨Leica accepts no liability if the instrument is modified or serviced by unauthorized persons, not maintained as specified (unless maintenance is performed by us) or not used/handled properly.
⇨Interaction of other devices through the Leica surgical microscope was proven in accordance with EN 60 601-1-2. The system passed the emission and immunity test. The standard safety precautions and safety requirements relating to electromagnetic and other radiation must be observed.
⇨Domestic electrical installation must be conducted in accordance with the national standard, e.g. use of a residual current protective device (FI protection) is recommended.
⇨As with every other instrument used in operative applications, this system is subject to failure. Leica Microsystem (Schweiz) AG therefore recommends that a backup system be kept available during the operation.

Directions for the operator of the instrument

⇨Follow the instructions described here.
⇨Follow the directions provided by your employer regarding work organization and safety.

Stability
When moved in the OP, the swing arm must be folded up and locked and the brakes must be applied, otherwise the swing arm may drift out of control and the stand could topple.

Hazards due to moveable parts
This section describes uses that, inadvertently, could lead to hazardous situations.

- Add accessories and balance the stand before the operation, and never over the field of operation.
- Do not put your fingers between the microscope and the focusing drive; they could get crushed.

Floor stand:
- When displacing the stand, push it. Do not pull it. Feet in light-weight shoes could become trapped beneath the casing of the base.
- The footbrakes must remain engaged throughout the operation.

Electrical terminals
The control unit may be opened only by a Leica-approved service technician.

Accessories
Only the following accessories may be used on the Leica M525 OH4 surgical microscope:
- The Leica accessories described in this user manual.
- Other accessories, provided that these have been expressly approved by Leica as being technically safe in this context.

Dangers of use

Warning 1
Danger of fatal electrical shock!
⇨The Leica M525 OH4 surgical microscope may be connected to a grounded safety socket only.

Warning 2
Danger of fatal electric shock.
⇨Operate the system only with all equipment in its proper position (all covers fitted, doors closed).

Warning 3
Risk of injury through surgical microscope moving down!
⇨Complete all preparations and adjustments to the stand before the operation.
⇨Never balance or re-equip the instrument over the field of operation.
⇨Always lock the Leica M525 OH4 in position before re-equipping it.
⇨Balance the Leica M525 OH4 after re-equipping it.
⇨Do not release the brakes when the instrument is in an unbalanced state.
⇨Before re-equipping during the operation, first swing the microscope away from the operating field.

Warning 4
Danger of injury due to movement of the microscope during the balancing process.
⇨Do not stand next to the microscope during the balancing process.

Warning 5
Danger of injury due to swinging down of the Leica M525 OH4 surgical microscope.
⇨Never balance or re-equip the instrument over the field of operation.
⇨Balance the Leica M525 OH4 surgical microscope after re-equipping it.
⇨Do not release the brakes when the instrument is in an unbalanced state.
⇨Never perform intraoperative AC / BC balancing over the patient.

Warning 6
Danger of injury due to:
- **Uncontrolled lateral movement of the swing arm!**
- **Tilting of the stand!**
- **Feet in lightweight shoes could become trapped beneath the casing of the base.**

⇨For transportation, always move the Leica M525 OH4 surgical microscope into the transport position.
⇨Never move the stand in the extended condition.
⇨Never roll over cables lying on the floor.
⇨Always push the Leica M525 OH4 surgical microscope - never pull it.

Warning 7
At a short focal distance, the light source of the illumination unit may possibly be too bright for the operating physician and the patient.
⇨Start with a low light level and gradually increase the light intensity until the operating physician has an optimally illuminated image.

Warning 8
Danger to the patient due to failure of the focus motor!
⇨In case of failure of the focus motor, the focus can be adjusted manually.

Warning 9
Danger of serious damage to tissue due to incorrect working distance!
⇨When using lasers, always set the working distance of the microscope to laser distance and lock the microscope in position.

Warning 10
Danger to patient due to failure of the zoom motor!
⇨In case of failure of the zoom motor, the zoom can be adjusted manually.

Warning 11
Danger of serious damage to tissue due to incorrect manual adjustment of the working distance!
⇨Do not adjust the rotary button for manual setting of the working distance while using the laser.

Warning 12
Not suitable for use in ophthalmology!

Caution 1
Danger of injury due to falling weight disk or cover!
⇨When changing the weight disk, make sure that your feet are not beneath the weight disk or the cover.

Caution 2
Surgical microscope can move without warning!
⇨Always lock the footbrake when you are not moving the system.

Caution 3
Damage to the Leica M525 OH4 surgical microscope due to uncontrolled tilting!
⇨ Hold the CAN handles securely before you press the "All Brakes" button.

Caution 4
Damage to the Leica M525 surgical microscope during transportation!
⇨Never move the stand in the extended condition.
⇨Never roll over cables lying on the floor.

Caution 5
Risk of infection!
⇨Leave sufficient space around the stand to ensure that the sterile drape does not come into contact with non-sterile components.

Caution 6
Hot lamp insert can cause burns!
⇨Do not touch the hot lamp insert.

Caution 7
Heating of tissue
If the illumination field diameter is larger than the visual field and the light intensity is set too high, uncontrolled heating of tissue can occur outside the visible range of the microscope.
⇨Do not set the light intensity too high.

Caution 8
Destruction of the zoom motor!
⇨Use the manual adjustment of the zoom motor only if the zoom motor is defective.

Caution 9
Damage of the touch panel
⇨Operate the touch panel using your fingers only. Never use hard, sharp or pointed objects made out of wood, metal or plastic.

Caution 10
Damage of the touch panel
⇨Never clean the touch panel using cleaners that contain abrasive substances. These substances can scratch the surface and cause it to be become dull.

Caution 11
Danger of skin burns!
The lamp insert is very hot.
⇨Before changing the lamp, make sure that the lamp insert has cooled down.

Manufacturer's declaration of electromagnetic compatibility (EMC)

This "Guidance and manufacturer's declaration" document is based on EN 60601-1-2:2001.

Table 201 from EN 60601-1-2:2001

Guidance and manufacturer's declaration – electromagnetic emissions		
The Leica M525 OH4 surgical microscope is intended for operation in an environment as specified below. The customer or the user of the Leica M525 OH4 surgical microscope should make sure that it is used in such an environment..		
Emissions test	**Compliance**	**Electromagnetic environment – guidance**
RF emissions according to CISPR 11	Group 1	The Leica M525 OH4 surgical microscope uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions according to CISPR 11	Class A	The Leica Leica M525 OH4 is suitable for use in establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for residential purposes.
Harmonic emissions according to IEC 61000-3-2	Class A	
Emissions of voltage fluctuations/flicker according to IEC 61000-3-3	compliant	

Table 202 from EN 60601-1-2:2001

Guidance and manufacturer's declaration – electromagnetic immunity			
The Leica M525 OH4 surgical microscope is intended for operation in an environment as specified below. The customer or the user of the Leica M525 OH4 surgical microscope should make sure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
Discharge of static electricity (ESD) according to IEC 61000-4-2	± 6KV contact discharge ± 8KV air	± 6KV contact discharge ± 8KV air	Floors should be of wood, concrete or ceramic tile. If the floor is of synthetic material, the relative humidity must be at least 30%.
High-freq. transient electrical interference / Burst according to IEC 61000-4-4	± 2KV for power lines ± 1KV for input and output lines	± 2KV for power lines ± 1KV for input and output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surges according to IEC 61000-4-5	± 1KV normal mode ± 2KV common mode	± 1KV normal mode ± 2KV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage drops short interruptions and voltage variations IEC 61000-4-11	<5% UT (>95% dip in UT) for ½cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec.	<5% UT (>95% dip in UT) for ½cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Leica M525 OH4 surgical microscope requires that the instrument remain functional even after mains power interruptions, it is recommended that the Leica M525 OH4 surgical microscope be provided with an auxiliary power source such as an uninterruptible power supply (UPS) or battery back-up.
Magnetic fields at mains frequency (50/60Hz) according to IEC 61000-4-8	3 A/m	not applicable	
Note:	U_T is the a.c. mains voltage prior to application of the test level.		

Table 204 from EN 60601-1-2:2001

Guidance and manufacturer's declaration – electromagnetic immunity			
The Leica M525 OH4 surgical microscope is intended for operation in an environment as specified below. The customer or the user of the Leica M525 OH4 surgical microscope should make sure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment – guidance**
			Portable and mobile RF communications should be used no closer to any part of the Leica M525 OH4, including its cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
Conducted RF – Interference according to IEC 61000-4-6	$3V_{eff}$ 150kHz to 80MHz	$3V_{eff}$	**Recommended separation distance:** $d = 2.4\sqrt{P}$ for 150kHz to 80MHz
Radiated RF – Interference according to IEC 61000-4-6	3V/m 80MHz to 2.5GHz	3V/m	$d = 2.4\sqrt{P}$ for 80MHz to 2.5GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol:

Note 1: At 80MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Leica M525 OH4 surgical microscope is used exceeds the applicable RF compliance level above, the Leica M525 OH4 surgical microscope should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Leica M525 OH4 surgical microscope.

b Over the frequency range 150kHz to 80MHz, field strengths should be less than 3V/m.

Table 206 from EN 60601-1-2:2001

Recommend separation distances between portable and mobile RF telecommunications equipment and the Leica M525 OH4 surgical microscope	
The Leica M525 OH4 surgical microscope is intended for operation in an electromagnetic environment in which RF interference is controlled. The customer or the user of the Leica M525 OH4 surgical microscope can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Leica M525 OH4 surgical microscope as recommended below, according to the maximum output power of the communications equipment.	
	Separation distance according to frequency of transmitter in m
Rated maximum output power of transmitter W	**150kHz to 2.5GHz** $d = 2.4 \sqrt{P}$ in m
0.01	0.24
0.1	0.8
1	2.4
10	8.0
100	24.0
For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer. Note 1: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.	

Warning message:
If use is made of accessories or cables other than those specified in this user manual or approved by the manufacturer of the Leica M525 OH4 surgical microscope, this can lead to an increase in electromagnetic radiation or a reduction in EMC.

Warning message:
The Leica M525 OH4 surgical microscope must not be used directly adjacent other instruments.
If it is necessary to operate them in the vicinity of other instruments, the microscopes should be monitored to ensure that they function properly in this arrangement.

Signs and labels

1

2

DO NOT USE IN OPHTALMOLOGY

3

Grounding reliability can only be achieved when EQUIPMENT is connected to equivalent receptacle marked "Hospital only" or "Hospital Grade".

La fiabilité de la mise à la terre n'est assurée que si l'équipement est connecté à une prise équivalente, marquée «Hôpital seulement» ou «Qualité hôpital».

4

MITAKA KOHKI CO. LTD
No.
Made in Japan

5

Leica Microsystems (Schweiz) AG
CH-9435 Heerbrugg
MODEL LEICA M525 OH4
1600 VA 50/60 Hz
100/120/220/240 V ~
PRIM 100/120 V PRIM 2xT10A
220/240 V PRIM 2xT8A

6

PAT No. 5.528.417
PAT No. 6.050.530

7

8

1
2
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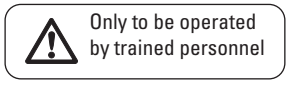

Only to be operated
by trained personnel

2

3

CAUTION
Locked
Free

4

Maintenance instructions

- Put a dust cover over the instrument during breaks in work.
- Keep accessories in a dust-free place when not in use.
- Remove dust with a pneumatic rubber pump and a soft brush.
- Clean the objectives and eyepieces with special optics cleaning cloths and pure alcohol.
- Protect the surgical microscope from damp, vapors, acids, alkalis, and corrosive substances.
  Do not keep chemicals near the instrument.
- Protect the surgical microscope from improper handling.
  Install other device sockets or unscrew optical systems and mechanical parts only when explicitly instructed to do so in this user manual.
- Protect the surgical microscope from oil and grease.
  Never oil or grease the guide surfaces or mechanical parts.
- Remove coarse debris with a moistened disposable cloth.
- For disinfecting the surgical microscope, use compounds from the surface disinfecting group based on the following active ingredients:
  aldehydes,
  alcohols,
  quaternary ammonia compounds.

☞ Due to potential damage to the materials, never use substances based on
  halogen splitting compounds,
  strong organic acids,
  oxygen splitting compounds.

☞ Follow the disinfectant manufacturer's instructions.

☞ It is recommended to conclude a service contract with Leica Service.

Cleaning the touch panel

⇨Before cleaning the touch panel, switch off your Leica M525 OH4 and disconnect it from the power supply.
⇨Use a soft, lint-free cloth to clean the touch panel.
⇨Do not apply cleaning agent directly to the touch panel; rather, apply it to the cleaning cloth.
⇨Use a commercially available glass/eyeglass cleaner or plastic cleaner to clean the touch panel.
⇨Do not apply pressure to the touch panel while cleaning it.

☞ The touch panel is resistant to most disinfectants used in the medical field.

⚠ **Caution 23**
Damage to the touch panel
⇨Operate the touch panel using your fingers only. Never use hard, sharp or pointed objects made out of wood, metal or plastic.

⚠ **Caution 24**
Damage to the touch panel
⇨ Never clean the touch panel using cleaners that contain abrasive substances. These substances can scratch the surface and cause it to be become dull.

Maintenance

The Leica M525 OH4 surgical microscope generally requires no maintenance. To ensure that it always operates safely and reliably, we recommend that you take the precaution of contacting the responsible service organization.
Here you can arrange for periodic inspections and, if necessary, conclude a maintenance contract.

☞ It is recommended to conclude a service contract with Leica Service.

☞ Use only original spare parts for servicing.

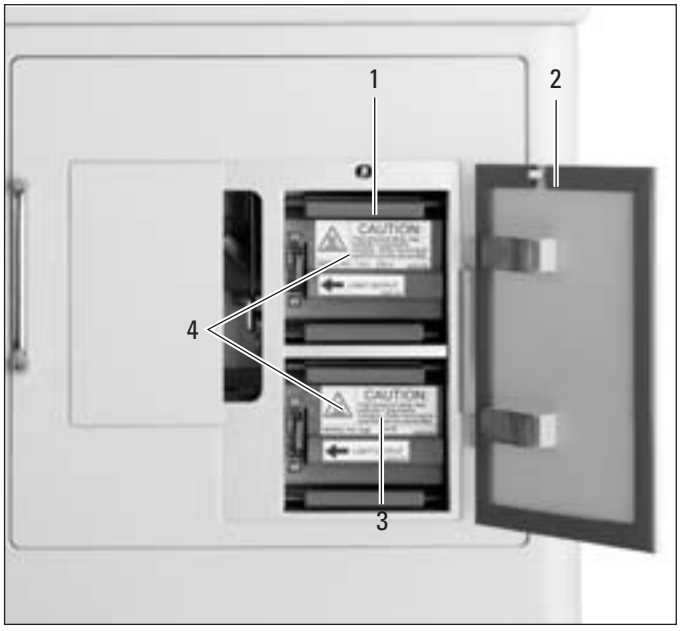
☞ After 18 months you will be reminded that the inspection is due when you switch on the microscope.

This Leica M525 OH4 microscope will function
best if serviced every 18 months.
Please contact your local authorized Leica
Service representative for a preventative
maintanance check.

⇨Press Exit.
The dialog window is closed.

Changing bulbs

⇨Open the access door (2) for lamp inserts.
The illumination push-button (item 2, page 7) flashes orange.



Caution 25
Danger of skin burns!
The lamp insert is very hot.
⇨Before changing the lamp, make sure that the lamp insert has cooled down.

⇨Remove the defective lamp insert (1 or 3) and install a new lamp insert (spare part no. 10 448 022).

When installing the lamp insert, make sure that the arrow (4) is pointing to the left.

⇨Close the access door.
The illumination push-button (item 2, page 7) lights up green.

A dialog window opens when the lamp power drops below the recommend minimum level.

Our sensor shows the Xe lamp you are using
is defective.
We recommend you have the lamp tested by
Leica Service representative or replace it.

⇨Press the "Close" button.
The dialog window is closed.
⇨Replace defective lamps.

Checking the timer for the xenon lamp

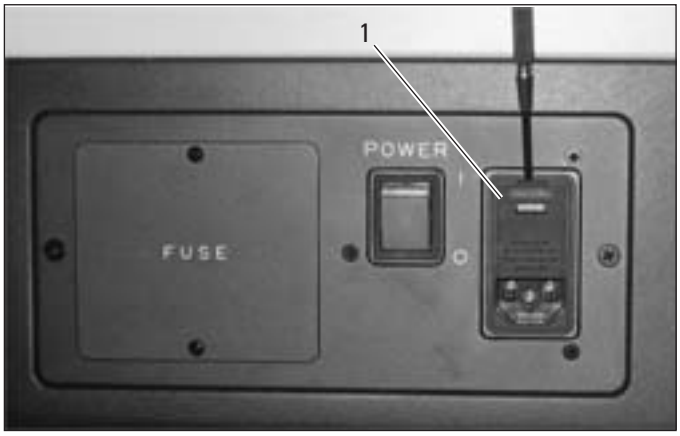
A timer window (5) for the xenon lamp is located on the main illumination fitting. It displays the operating hours of the xenon lamp.

We recommend that a xenon lamp with a remaining useful life of 10% be replaced before commencing an operation.

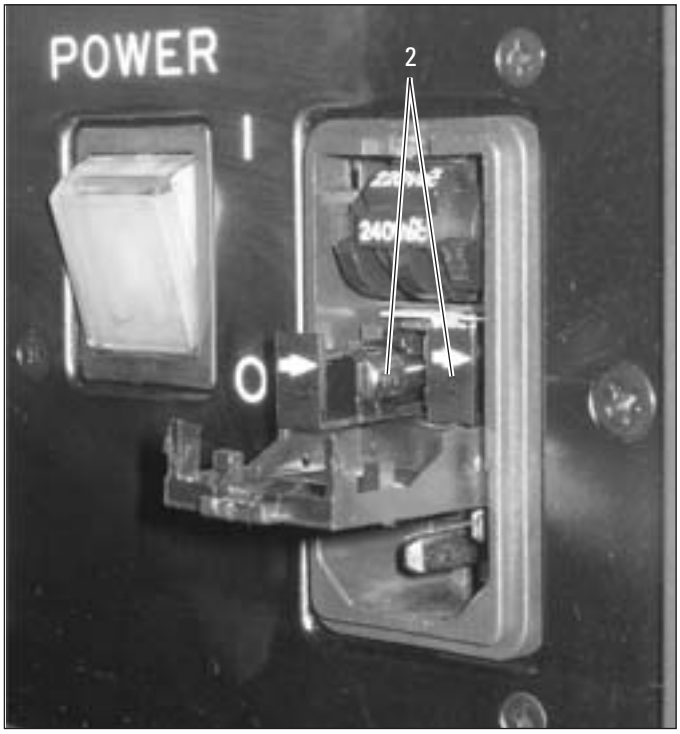
Changing fuses

Range 220V–240V: two 8A fuses, slow blow
Range 100V–120V: two 10A fuses, slow blow

⇨Remove the cover (1) with a screwdriver.



⇨Remove the fuses (2) from their receptacles and replace them.



Notes on reprocessing of resterilizable products

Products
Reusable products supplied by Leica Microsystems (Schweiz) AG such as rotary knobs, objective protective glasses and capping pieces.

Limitation of reprocessing:
For the medical devices used on patients suffering from Creutzfeldt Jacob Disease (CJD) or suspected of having CJD or variant CJD, the local statutory requirements have to be met. Normally resterilizable products used on this group of patients are to be eliminated without risk by incineration.

Occupational safety and health protection
Particular attention must be paid to the occupational safety and health protection of the persons responsible for preparing contaminated products. Current regulations of hospital hygiene and prevention of infection must be observed in the preparation, cleaning and disinfection of the products.

Limitation of reprocessing
Frequent reprocessing has little effects on these products.
The end of the product life cycle is usually determined by wear and year and damage through use.

Instructions

Workplace
Remove surface contamination with a disposable cloth / paper cloth.

Storage and transport
No special requirements.
It is recommended to perform the reprocessing of a product immediately following its use.

Preparation for cleaning
Remove the product from the Leica M525 OH4 surgical microscope.

Cleaning: manual
Equipment: running water, rinsing agent, spirit, micro-fiber cloth
Procedure:
1. Rinse surface contamination off of the product (temp. <40°C). Use some rinsing agent depending upon degree of contamination.
2. If the optics is heavily contaminated, e.g. finger marks, fat streaks etc., use spirit for cleaning.
3. Dry off products, except for optical components, with a disposable cloth/paper cloth. Dry off optical surfaces with a micro-fiber cloth.

Cleaning: automatic
Equipment: Cleaning/disinfecting device
It is not recommended to clean products with optical components in a cleaning/disinfecting device. In addition, optical components must not be cleaned in ultrasonic baths in order to prevent damage.

Disinfection
The alcohol disinfection solution "Mikrozid, Liquid" may be used in accordance with the instructions on the label.
Please note that optical surfaces must be rinsed thoroughly with fresh drinking water, followed by fresh demineralized water, after disinfection. The products must be dried thoroughly before the subsequent sterilization.

Maintenance
No special requirements.

Control and functional test
Check the snap-on behavior of rotary knobs and CAN handles.

Packaging
Separate: A standard PE bag may be used. The bag must be large enough for the product so that the closure is not under tension.

Sterilization
See Table 1

Storage
No special requirements.

Additional information
None

Contact information of manufacturer
Address of local agent

Leica Microsystems (Schweiz) AG verified that the aforementioned instructions for the preparation of a product are suitable for its reuse. The processing person is responsible for reprocessing with the equipment, materials and personnel and for achieving the desired results in the reprocessing installation. In general, this requires validations and routine monitoring of the process. Every deviation from the supplied instructions should also be examined carefully by the processing person to determine effectiveness and possible detrimental consequences.

Table 1: Sterilization

		Permissible sterilization methods	
Item no.	Designation	Steam (autoclave) 134°C, t > 10min.	Ethylene oxide max. 60°C
10180591	Clip-on handle	X	
10428328	Rotary knob, binoc. tube T	X	
10384656	Rotary knob, transparent	X	
10443792	Lever extension	X	
10429792	Capping piece, slit lamp	X	
10445368	Cover, binoc. tube 0–180°	X	
10445289	Handswitch holder	X	
10446058	Protective glass, multifoc. obj.		X [1)]
10446469	Objective protective glass Leica M680		X [1)]
10446467	Objective protective glass Leica M840/M841		X [1)]
10443714	Rotary ring, objective 0°	X	
10445341	Handle for Leica M655. sterilizable	X	
10445549	Handle for Leica M695	X	
10445340	Cap for Leica M655/M695. sterilizable	X	

[1)] Products with optical components can be steam-autoclaved using the conditions listed above. However, this may lead to the formation of a layer of dots and streaks on the glass surface, which may reduce the optical performance.

General faults

☞ If the equipment is no longer operating properly, please consult your Leica representative.

Fault	Cause	Remedy
The microscope tilts when you press the "All Brakes" button.	The swing arm is not correctly balanced.	⇨Balancing the swing arm (see page 27).
The microscope cannot be moved or moved only with a great deal of effort.	A cable is sticking.	⇨Re-lay the affected cable.
	Leica M525 OH4 locked.	⇨Release the lock (see page 22).
Functions cannot be operated with the footswitch or the control on the CAN handles.	A cable connection has come loose.	⇨Check the power cable. ⇨Check the footswitch connection.
	Incorrect assignment entered at control unit.	⇨Change the assignments on the control unit.
No light in the microscope.	The fiber optic cable has come loose.	⇨Check the optical fiber connection.
	Main illumination and/or backup illumination defective.	⇨Switch to different light source (see page 40).
The image remains unfocussed.	Eyepiece are not mounted correctly.	⇨Screw in the eyepiece completely.
	Diopters not set correctly.	⇨Perform diopter correction exactly as instructed (see page 24).
The microscope or the swing arm moves up/down or rotates by itself.	Swing arm is not correctly balanced.	⇨Balance the Leica M525 OH4 (see page 27).
	Cables are not correctly laid or have slipped out of position and exert force on the system (poss. additional video cable).	⇨Lay the cable in accordance with the installation instructions and provide a strain relief.
	Leica M525 OH4 was balanced in a locked state.	⇨Release the lock (see page 22) and balance the Leica M525 OH4 (see page 27).
Microscope and swing arm are difficult to move or cannot be moved at all.	Automatic balancing was not completed.	⇨Make sure that the microscope is in position B (see page 30). ⇨Press the push-button for Auto Balance again.

What to do if...?

Fault	Cause	Remedy
Automatic balancing cannot be performed.	Microscope is tilted at too great an angle.	⇨Align A/B axes on microscope in parallel (see page 30). ⇨Repeat automatic balancing procedure.
Zoom cannot be adjusted electrically.	Failure of the zoom motor.	⇨Press the Zoom rotary button. ⇨Set the zoom by turning the button (see page 41).
No XY movements are possible at one of the two CAN handles.	No XY movements have been set in the control unit for the CAN handles.	⇨Set the joystick to XY movement (see page 50).
The microscope has not been balanced exactly in the B-axis.	Installed accessory was not turned back to the working position when balancing the B axis.	⇨Balance the B-axis again. Make sure that the accessory is turned back to the working position when balancing the B-axis (see page 28). Perform intraoperative B/C balancing (see page 30).
The push-button for automatic balancing is flashing, but the acoustic signal is not sounding (nothing is happening).	Balancing process still not complete.	⇨Rotate the microscope to the B-position and press the Autoblance push-button.
Swing arm cannot be moved.	Swing arm locked in position.	⇨Release the lock (see page 22).
The stand of the Leica M525 OH4 moves.	Footbrake not applied.	⇨Lock the footbrake in position (see page 35).
The range of movement of the Leica M525 OH4 is limited (swing, tilt, rotate, XY movement).	Cable laid too tightly.	⇨Re-lay the cable (see assembly instructions Leica M525 OH4).
	Video camera was not correctly mounted and touches the swing arm.	⇨Mount the video camera correctly.
Leica M525 OH4 is not correctly balanced.	Position of accessory was changed after balancing.	⇨ Balance the Leica M525 OH4 (see page 27). ⇨Perform intraoperative AC/BC balancing of the Leica M525 OH4 (see page 30).

Fault	Cause	Remedy
Leica M525 OH4 cannot be balanced.	The weight disk which you are using on the D-axis cannot balance installed accessories.	⇨Changing the weight disk on the D axis (see page 33).
	Leica M525 OH4 was balanced in the transport position.	⇨Move the Leica M525 OH4 out of the transport position and balance it again.
Focus on microscope cannot be adjusted.	Multifocus switch is "on".	⇨Switch off the multifocus (see page 42). Exception: you are using a laser micromanipulator which has this function as a safety precaution.
The image appears shaded through the microscope at the edges and the illumination field is outside the field of vision.	Accessories not installed exactly.	⇨Install the accessories exactly in the holders (see page 22).

TV, photography

Fault	Cause	Remedy
Photographs/TV pictures unfocussed.	Microscope or Zoom Video Adapter not precisely focussed.	⇨Focus precisely, insert graticule if necessary. ⇨Perform diopter correction exactly as instructed.
	Zoom Video Adapter is not set parfocal.	⇨Set the Zoom Video Adapter parfocal as instructed.
The photographs have a blue tone.	An incorrect film was used.	⇨Load daylight film.

Error messages on the control unit

Fault	Cause	Remedy
"Check lamp 1/2"	Lampe 1/2 is defective.	Check and replace defective lamp 1/2 after surgery.
"Device not present"	A cable connection has loosened or is defective.	Contact your Leica represantative.
"No Connection to MDRS3"	A cable connection has loosened or is defective.	Chek connection cable.
"Rear load too high"	Mounted accessories cannot be be balanced.	Reduce Load on back side of optics carrier.
"Front load too high"	Mounted accessories cannot be be balanced.	Reduce Load on front side of optics carrier.
"Rear load too high"	Mounted accessories cannot be be balanced.	Reduce Load on back side of optics carrier.
"Front load too high"	Mounted accessories cannot be be balanced.	Reduce Load on front side of optics carrier.
"Left hand side load too high"	Mounted accessories cannot be be balanced.	Reduce Load on left side of optics carrier.
"Rught hand side load to high"	Mounted accessories cannot be be balanced.	Reduce Load on right side of optics carrier.
"Too many counterweight wheels at D axis"	Wheel counterweight used on the D axis cannot compensate for the mounted accessories	Change wheel counterweight on the D axis (see page 34)
"Too less counterweight wheels at D axis"	Wheel counterweight used on the D axis cannot compensate for the mounted accessories	Change wheel counterweight on the D axis (see page 34)
"Illumination unit not closed"	Access hatch for lamp inserts is not closed.Pushbutton for illumination flashes.	Close access hatch and lock with rotary knob.
"Microscope-Device-Controller not present"		Contact your Leica represantative.

Electrical data

Power connection for Leica M525 OH4	1600 VA 50/60 Hz 100 V (+10%/–15%) 120 V (+10%/–15%) 220 V (+10%/–15%) 240 V (+10%/–15%)
Protection class	Class 1

Leica M525

Microscope

Magnification	6:1 zoom, motorized
Working distance	207mm – 470mm, variable through motorized multifocal lens, continuously adjustable; manually adjustable override
Focusing	Motorized via multifocal lens; manually adjustable
Eyepiece	Wide-field eyepieces for spectacle wearers 10x and 12.5x dioptric settings ±5 with adjustable eye cup
Objective	Multifocal lens; 207–470mm variable working distance, with optional WD extender lens
Illumination	Illumination system specially developed for microsurgical applications; continuously adjustable illumination field diameter with Gauss-shaped light distribution. Continuously adjustable brightness at constant color temperature
AutoIris™	Built–in automatic zoom-synchronized illumination field diameter, with manual override and reset feature
Main light source	High performance 300 Watt xenon arc-lamp through fiber optic
Emergency lamp	300 Watt xenon arc-lamp on separate electrical system
BrightCare™	Safety technology for the working distance synchronized to light control

Optical data

Magnification range	1.2x – 12.8x with 10x eyepiece
Field of view (dia. in mm)	16.5mm – 180mm with 10x eyepiece

Microscope carrier

Rotation of optics	540°
Lateral tilt	50° to left / 50° to right
Inclination tilt	–30° / +120°
XY speed	Zoom linked XY speed
Balancing	A,B,C and D axes fully automatic, each can be corrected manually
Intraoperative balancing	AC/BC button for automatic intraoperative balancing of A&C axes and for B&C axes
Brakes	1 brake for A/B axis 1 brake for C axis
Indicator	LED for Fluorescence mode status, LED for Video record status

Accessories

Leica ULT500	180° stereo observer, Main/Assistant surgeon 40% each beam path Assistant /Video on selectable side 20% each beam path
Dual stereo attachment	Main surgeon 70% / Assistant 30%
Second observer	Stereo attachment for second observer to beam splitter
Beam splitter	50% / 50%, 70% / 30%
Binocular tube	Variable angle 30° – 150°, variable angle 0° – 180°
Video Adapter	3:1 zoom, 35mm – 100mm focal length, c-mount, with fine focus
Imaging	Leica DI C500 high resolution true color dual imaging module for correlated and non correlated data display
Asepsis	Sterilizable protective glass cover for the objective, sterilizable components for various controls, commercially available drapes
Laser	Various commercially available lasers and laser shutters can be attached

IGS

Interface / Compatibility	Open architecture for IGS systems

Fluorescence

Vascular Fluorescence	Optional Leica FL800 is available in USA, EU, and most countries
Oncology Fluorescence	Optional Leica FL400 available in EU and some other countries (Please check the status of approval with your Leica representative).

Floor stand

Type	Floor stand with six electromagnetic brakes
Base	720mm x 720mm with four 360° rotatable casters with 130mm diameter each, one central single step foot brake
Balancing	New "no brake release" Auto-Balance: One button / two push for complete automatic balancing of stand and optics
Intraoperative Balancing	AC/BC button for automatic intraoperative balancing of the AC axis and for BC axis
Swingarm	Patented advanced movement system for perfect balance in six axes, new vibration damping technology
Floorstand control unit	New generation touch panel technology. The latest electronics control for the continuous governing of all motor functions and the light intensity. Data shown by means of LCD. Built-in BrightCare™ technology for the working distance synchronized light control. ISUS ™ Intelligent Setup System, Menu selection based on unique software for user-specific configuration, with built-in electronic auto-diagnosis and user support.
Control unit stand	Software independent hard keys for illumination and auto-balancing. Indicator for Main / backup illumination and Fluorescence modes, Open architecture for future software developments.
Light source	Dual Xenon arc-lamp illumination system and built in automatic lamp quick changer
Controls	10 function pistol grips for zoom, focus, all-free release of six brakes, side button for user-defined brakes, motorized lateral tilt and inclination (XY) or Leica DI C500 functions. Except for the all-free button all functions are freely programmable. Mouthswitch for releasing the user defined brakes 12 function foot control and handswitch
Integration of documentation	Prepared for integration of Video- and digital recording systems. Open architecture
Connectors	Numerous built-in connectors for Video, IGS and control data transfer, Internal Power 12 VDC, 19 VDC and AC connections
Carrier for monitor	700mm long and flexible arm with 4 axis for rotation and inclination to carry optional video monitor
Materials	All solid metal construction
Surface coating System	Coated with antimicrobial paint
Minimum height	In park position 1945mm
Range Cantilever	Max. 1925mm
Load	Min. 6.7kg and max. 12.2kg of accessories to the microscope
Weight	Approx. 320kg with full load

Ambient conditions

In use	+10°C to +40°C +50°F to +104°F 30% to 95% rel. humidity 500mbar to 1060mbar atmospheric pressure
Storage	–40°C to +70°C –40°F to +158°F 10% to 100% rel. humidity 500mbar to 1060mbar atmospheric pressure

Standards fulfilled

Conformity CE

- Directive 93/42/EEC concerning medical devices: Class I, in conformity with Annex IX, Regulation 1, with reference to Regulation 10 and 12 of the directive.
- Medical electric equipment, Part 1: General requirements for safety IEC 60601-1; EN 60601-1; UL60601-1; CAN/CSA-C22.2 NO. 601.1-M90
- Electromagnetic compatibility IEC 60601-1-2; EN 60601-1-2
  According to the SQS Certificate, the Business Unit SOM, within Leica Microsystems (Schweiz) AG, holds the management system certificates for the international standards ISO 9001:2000 /ISO 13485:2003 and ISO 14001:2004 relating to quality management, quality assurance and environmental management.

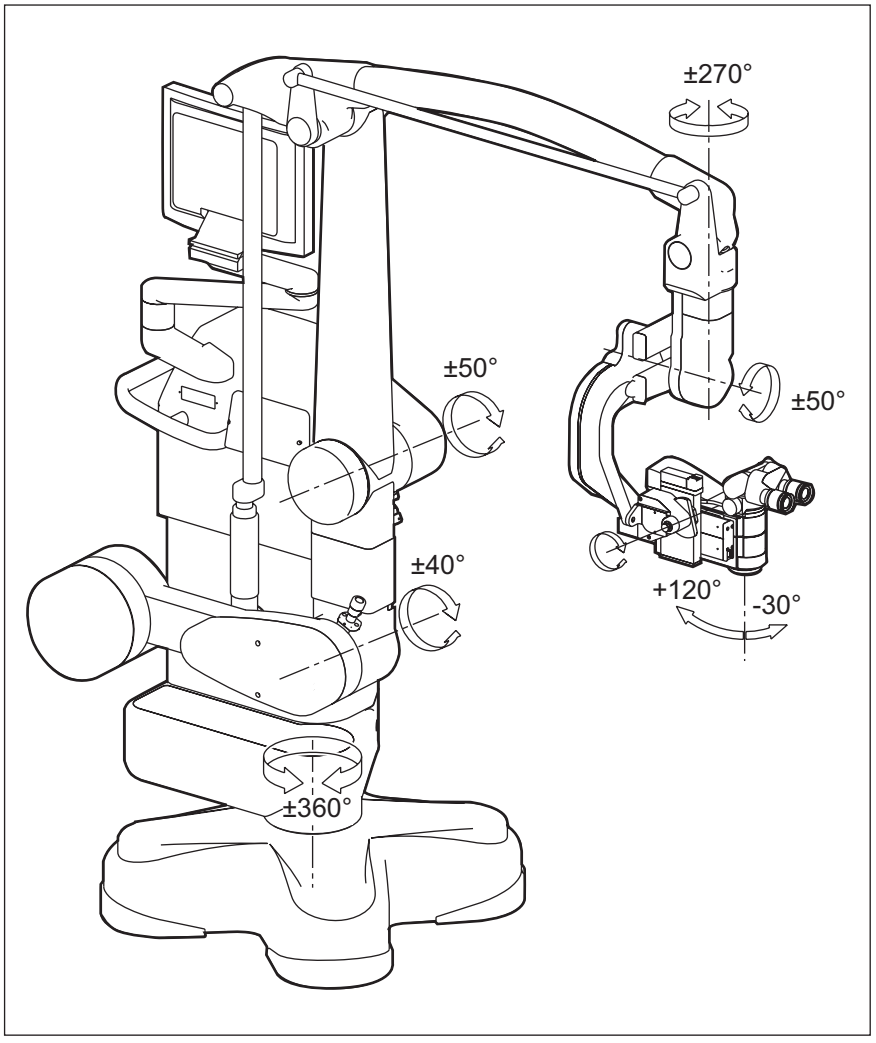
Limitations of use

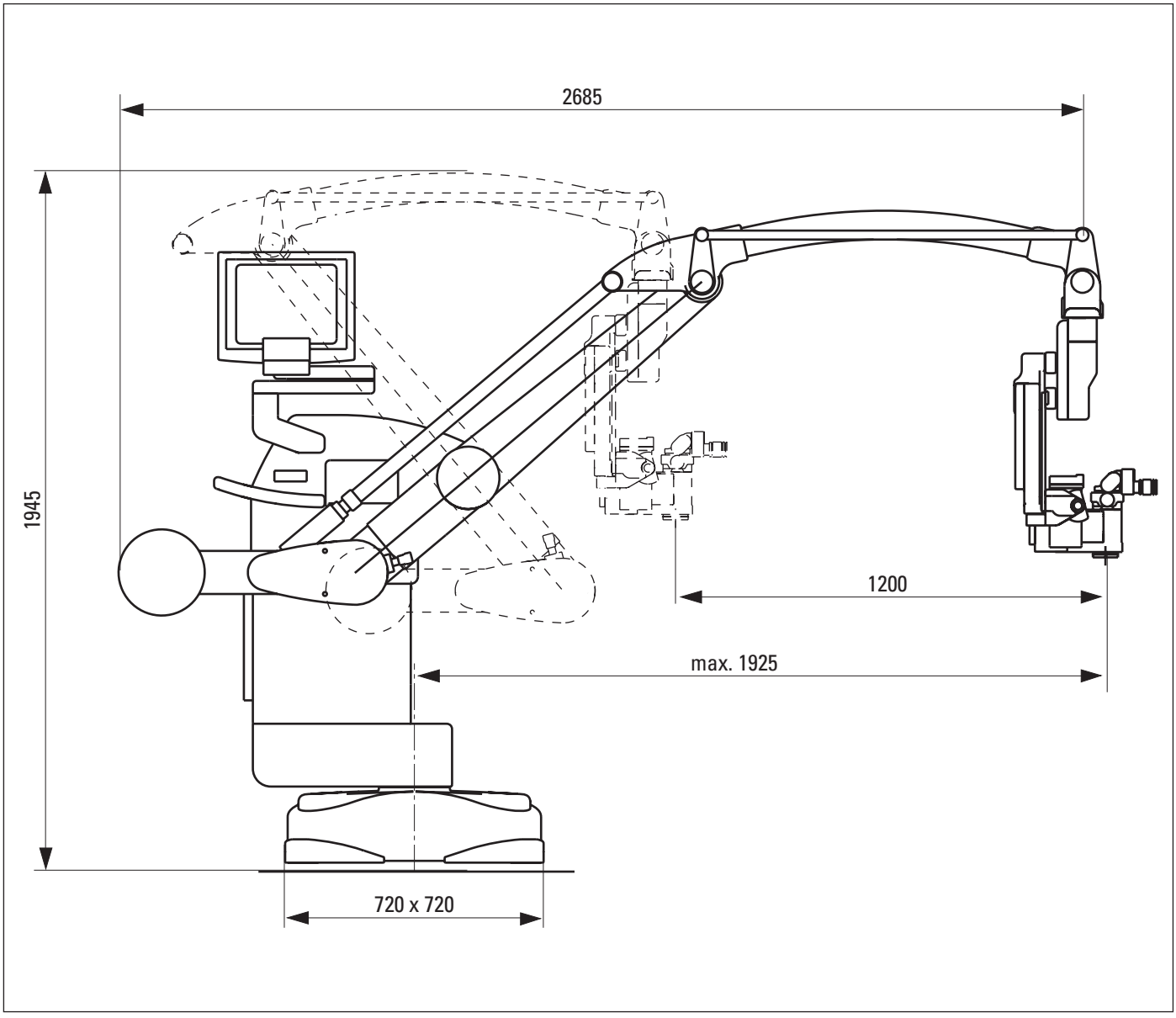
The Leica M525 OH4 may be used only in closed rooms and must be placed on a solid floor.

List of weights of balanceable configurations

			Minimum specification		US standard		Maximum specification		Maximum specification Fluorescence	
Leica Art. No.	**Designation**	**Unit weight (kg)**	**Qty.**	**Gross weight (kg)**	**Qty.**	**Gross weight (kg)**	**Qty**	**Gross weight (kg)**	**Qty.**	**Gross weight (kg)**
10446570	Counterweight, M500	2.900	1	2.900		0.000		0.000		0.000
10455349	30° rotary ring	0.184	1	0.184		0.000		0.000		0.000
10446058	Multifocal protective glass	0.017	1	0.017	1	0.017	1	0.017		0.000
10446587	Binocular tube, straight, T, Type II	0.795		0.000		0.000		0.000		0.000
10446797	Binocular tube tiltable, 30–150°	0.795	2	1.590	3	2.385	3	2.385	2	1.590
10446574	Binocular tube tiltable, T, Type II	0.700		0.000		0.000		0.000		0.000
10446485	Eyepiece size 10x/21B, Type II	0.100	4	0.400	6	0.600	6	0.600	6	0.600
10446482	Beam splitter M500, 50/50% light distribution	0.360	1	0.360		0.000		0.000		0.000
10446475	Stereo assistant's attachment, M500	0.920	1	0.920	1	0.920	1	0.920	1	0.920
10446573	Binocular tube, tiltable, 0–180°, T, Type II	1.400		0.000		0.000		0.000	1	1.400
10446592	Zoom video adapter	0.720	1	0.720	1	0.720	1	0.720		0.000
	Video camera	0.360	1	0.360	1	0.360	1	0.360		0.000
10446852	DI-Color Module (DI C500)	4.140		0.000		0.000	1	4.140	1	4.140
10446854	Ultra Observer (ULT500)	3.020		0.000	1	3.020		0.000		0.000
10713669	NIR Dual Video Adapter incl. objective	1.240		0.000		0.000		0.000	1	1.240
	UV camera handle	0.100		0.000		0.000		0.000	1	0.100
10713897 10713667	Sony NIR camera	0.040		0.000		0.000		0.000	1	0.040
10713680	Observation filter module	0.500		0.000		0.000		0.000	1	0.500
10713648	FL illumination module incl. adapter plate	0.840		0.000		0.000		0.000	1	0.840
10446469	M680 sterile glass	0.060		0.000		0.000		0.000	1	0.060
	Gross weight			**7.451**		**8.022**		**9.142**		**11.430**

Illustrations of measure

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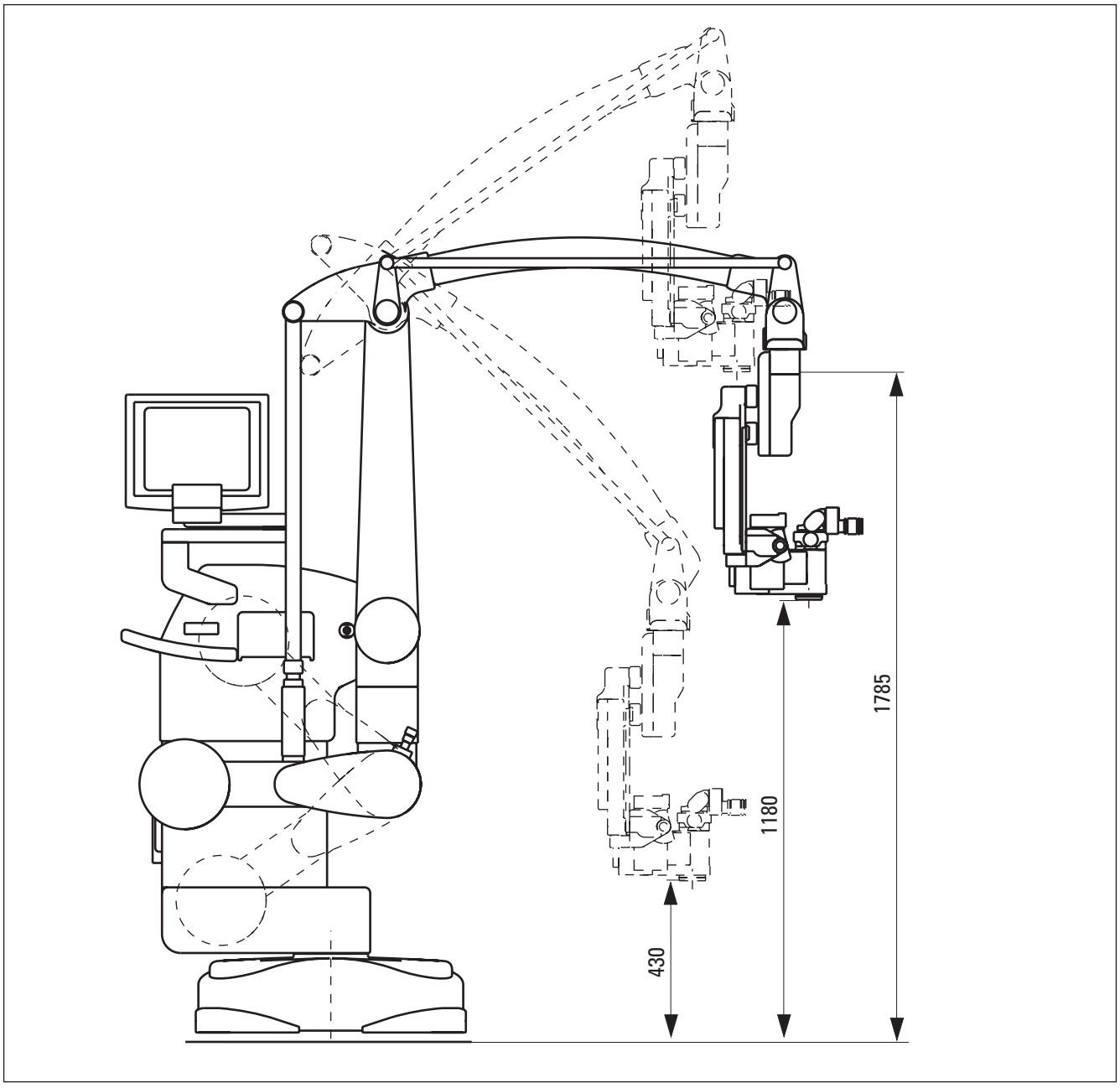
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Leica Microsystems – the brand for outstanding products

Leica Microsystems' mission is to be the world's first-choice provider of innovative solutions to our customers' needs for vision, measurement and analysis of microstructures.

Leica, the leading brand for microscopes and scientific instruments, developed from five brand names, all with a long tradition: Wild, Leitz, Reichert, Jung and Cambridge Instruments. Yet Leica symbolizes innovation as well as tradition.

Leica Microsystems – an international company with a strong network of customer services

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